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NATIONAL DAM SAFETY PROGRAM. MORGAN LAKE DAM (INVENTORY NUMBER --ETC(U)
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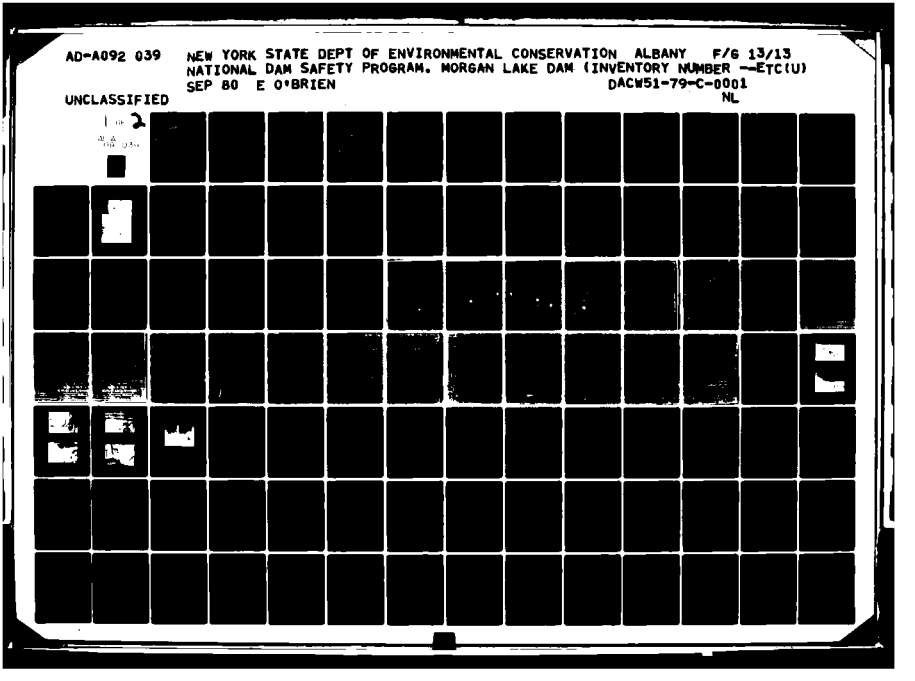

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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A092 039
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) Phase I Inspection Report Morgan Lake Dam Hudson River Basin, Dutchess County, New York Inventory No. 787	5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Eugene O'Brien	8. CONTRACT OR GRANT NUMBER(s) DACW-51-79-C-0001
9. PERFORMING ORGANIZATION NAME AND ADDRESS Tippetts-Abbett-McCarthy-Stralton 655 Third Avenue New York, NY 10017	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Conservation 50 Wolf Road Albany, NY 12233	12. REPORT DATE 12 September 1980
	13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Department of the Army 26 Federal Plaza New York District, CofE New York, NY 10287	15. SECURITY CLASS. (of this report) UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

LEVEL II 8

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Morgan Lake
Dutchess County
Hudson River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and visual inspection of Morgan Lake Dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

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Using the Corps of Engineers screening criteria for initial review of spillway adequacy, it has been determined that the combined capacity of both spillway pipes is inadequate for all floods in excess of 5 percent of the Probable Maximum Flood. Overtopping of the dam would significantly increase the hazard to loss of life and property, and therefore, the spillway is adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream of the dam.

In addition, field and laboratory investigations should be performed to determine subsurface conditions, soil parameters, and the nature of embankment and abutment seepage. A stability analysis should be performed to determine whether the dam is structurally stable during design flood conditions.

It is therefore recommended that within 3 months of notification to the owners, a detailed hydrologic/hydraulic investigation of the structure should be undertaken to determine the appropriate mitigating measures to be taken. At the same time, a stability analysis of the dam should be performed, including field and laboratory investigations. Within 12 months of the date of notification, appropriate remedial measures should be completed. In the interim, a detailed emergency operation plan and warning system should be developed and around-the-clock surveillance should be provided during periods of unusually high precipitation.

In addition, the dam has a number of problem areas, which if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within 1 year. These areas are:

1. The seepage occurring along the downstream slope, at the toe, and at the left abutment contact must be monitored and observations recorded. Construction of weirs and monitoring of flow at bi-weekly intervals should be performed to properly ascertain the nature of seepage.

2. The downstream spillway channel must be realigned so that it does not flow along the downstream toe of the embankment.

3. The leakage beneath the spillway pipe must be controlled.

4. Heavy brush, shrubs, trees and debris should be removed from all locations on the embankment and in the spillway channel. Provide a program of periodic cutting and mowing of the embankment surfaces and spillway channel.

5. Provide riprap along the upstream slope of the embankment.

6. Repair the reservoir drain outlet controls.

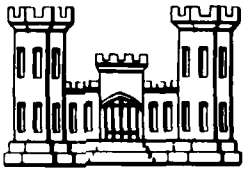
7. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of all gates and valves. Document this information for future reference. Also develop an emergency action plan.

HUDSON RIVER BASIN

MORGAN LAKE

DUTCHESS COUNTY, NEW YORK
INVENTORY NO. N.Y. 787

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1980

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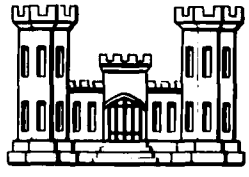


NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1980

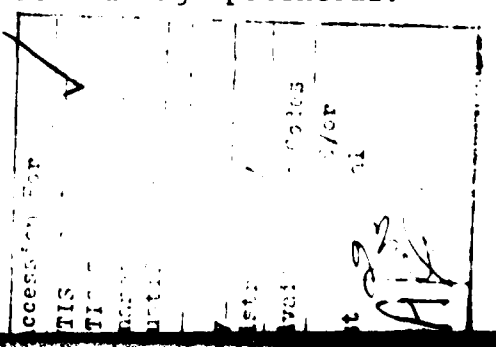
PREFACE

This report is prepared under guidance containted in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C., 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MORGAN LAKE DAM
I.D. NO. N.Y. 787
D.E.C. NO. 685
HUDSON RIVER BASIN
DUTCHESS COUNTY, NEW YORK

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APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Morgan Lake (I.D. No. 685)
State Located:	New York
County Located:	Dutchess
Stream:	Unnamed
Basin:	Hudson River
Date of Inspection:	24 April 1980

ASSESSMENT

The examination of documents and visual inspection of Morgan Lake Dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Using the Corps of Engineers screening criteria for initial review of spillway adequacy, it has been determined that the combined capacity of both spillway pipes is inadequate for all floods in excess of 5 percent of the Probable Maximum Flood. Overtopping of the dam would significantly increase the hazard to loss of life and property, and therefore, the spillway is adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream of the dam.

In addition, field and laboratory investigations should be performed to determine subsurface conditions, soil parameters, and the nature of embankment and abutment seepage. A stability analysis should be performed to determine whether the dam is structurally stable during design flood conditions.

It is therefore recommended that within 3 months of notification to the owners, a detailed hydrologic/hydraulic investigation of the structure should be undertaken to determine the appropriate mitigating measures to be taken. At the same time, a stability analysis of the dam should be performed, including field and laboratory investigations. Within 12 months of the date of notification, appropriate remedial measures should be completed. In the interim, a detailed emergency operation plan and warning system should be developed and around-the-clock surveillance should be provided during periods of unusually high precipitation.

In addition, the dam has a number of problem areas, which if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within 1 year. These areas are:

1. The seepage occurring along the downstream slope, at the toe, and at the left abutment contact must be monitored and observations recorded. Construction of weirs and monitoring of flow at bi-weekly intervals should be performed to properly ascertain the nature of seepage.

2. The downstream spillway channel must be realigned so that it does not flow along the downstream toe of the embankment.

3. The leakage beneath the spillway pipe must be controlled.

4. Heavy brush, shrubs, trees and debris should be removed from all locations on the embankment and in the spillway channel. Provide a program of periodic cutting and mowing of the embankment surfaces and spillway channel.

5. Provide riprap along the upstream slope of the embankment.

6. Repair the reservoir drain outlet controls.

7. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of all gates and valves. Document this information for future reference. Also develop an emergency action plan.

Eugene O'Brien, P.E.
New York No. 29823

Approved by:

Col. W. M. Smith, Jr.
New York District Engineer

Date: 12 Sep 80

GENERAL OVERVIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
MORGAN LAKE DAM
I.D. NO. N.Y. 787
D.E.C. NO. 685
HUDSON RIVER BASIN
DUTCHESS COUNTY, NEW YORK

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the State of New York, Department of Environmental Conservation by a letter dated 7 January 1980, in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, dated 8 August 1972.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances. Morgan Lake Dam is an earth embankment approximately 277 feet long, with a maximum height of about 20 feet. The crest is approximately 25 feet wide and serves as a two lane paved roadway.

According to existing drawings (Plates 2 and 3), the downstream slope is approximately 1V : 3H to 4H. Vegetation, ranging from small bushes to tall trees exists along the downstream slope. There are no data available which give the dimensions of the upstream slope, but it is believed to be similar to that of the downstream slope.

The spillway of the dam consists of a 30-inch diameter concrete pipe, approximately 20 feet long, located within the embankment near the

right abutment. The invert of the pipe is approximately 5 feet below the crest of the dam. Spanning the pipe and supporting the roadway is a wooden bridge. The approach channel consists of two 30 foot long timbers.

The spillway channel immediately downstream of the pipe has a base width of approximately 5 feet and a height of about 9 feet. The base and the sidewalls of the channel are protected with stone and boulders. The channel makes a 90° bend approximately 40 feet down from the pipe, wherein it continues along the toe of the dam. At the approximate midpoint of the dam, the channel bends downstream beneath an old ice house foundation to a vitrified clay pipe, and eventually to a 24-inch storm sewer pipe, approximately 500 feet downstream of the dam.

A 12-inch diameter low level outlet pipe exists near the left abutment. According to the drawings, the invert at the discharge point is El 195 feet. A valve exists near the outlet, which regulates flow through the pipe.

b. Location. The dam is situated in the City of Poughkeepsie, Dutchess County, New York. The dam is located adjacent to Creek Road, approximately 1/4 mile north of the Smith Street intersection.

c. Size Classification. The dam is 20 feet high and has a reservoir capacity of 115 acre-feet. Therefore, the dam is in the small size category. (less than 40 feet in height).

d. Hazard Classification. The dam is classified as high hazard due to the location of the Smith Street housing project directly downstream of the dam.

e. Ownership. Morgan Lake Dam is owned by the City of Poughkeepsie, and is maintained by the Department of Public Works, Howard Street Extension, Poughkeepsie, New York, 12601, Tel. (914) 485-4700, under the supervision of Mr. Alfred Signore, Superintendent of Public Works.

f. Purpose. Morgan Lake Dam creates a recreational pool.

g. Design and Construction History. The dam was constructed in 1868 and according to available reports, has since been reconstructed (See Appendix E). The nature of the reconstruction is unknown. No further data are available in connection with its design and construction history.

h. Normal Operating Procedure. Water release from the lake is uncontrolled through the 30-inch diameter concrete pipe. According to Mr. Signore, the reservoir drain has not been used due to an inoperable regulating valve.

1.3 PERTINENT DATA

a. Drainage Area	480	acres
b. Discharge at Damsite		
Maximum Known Flood at Damsite	Unknown	
Low Level Outlet	Inoperable	
Principal Spillway		
Maximum Pool (Estimated)	60	cfs
c. Elevation (U.S.G.S. Datum)		
Top of Dam	Varies: 213 to 215 feet	
Maximum Pool (Top of Crest at Lowest Point)	213	feet
Normal Pool	211	feet
Spillway (Principal)		
Upstream Invert	211	feet
Downstream Invert	210	feet
Reservoir Drain		
Upstream Invert	Unknown	
Downstream	195	feet
d. Reservoir		
Length of Normal Pool	900	feet
Length of Maximum Pool	900	feet
e. Storage		
Normal Pool	56	acre-feet
Maximum Pool at Lowest Point on Crest	91	acre-feet
f. Reservoir Surface		
Normal Pool	8.0	acres
Maximum Pool at Lowest Point on Crest	11.8	acres

g. Dam

Type	Earth
Length	277 feet
Maximum Height	20 feet
Top Width	25 feet
Side Slopes (V:H)	
Upstream	Unknown
Downstream	1:1.5 to 2

h. Low Level Outlet

Type	Unknown
Length	Unknown
Closure	Unknown

i. Spillway (Principal)

Type	Reinforced Concrete Pipe
Diameter	30-inch
Location	right abutment

j. Additional Spillway

At the time of this inspection, preparations were being made for the placement of an additional 30-inch spillway pipe at approximate invert El 209. Other pertinent data concerning the additional pipe are unknown.

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

Morgan Lake Dam is located in Hudson Lowlands physiographic province of New York State. These lowlands have gentle relief and are underlain by Ordovician shales that have been exposed by the erosion of overlying Silurian and Devonian limestones. Bedrock in the Morgan Lake Dam area is of the Normanskill Formation of the Taconic Area Trenton Group. The rock members in the Normanskill include graywacke, black and gray shales, chert, and red and green slate.

2.2 SOILS

Surface Soils in the vicinity of Morgan Lake Dam are of the Troy-Cossayuna Association. These soils, developed from a thick layer of glacial till derived from slate bedrock, are moderately to well drained, non-stony to slightly stony, and found on a 3 to 15% slope. A wetter, somewhat poorly drained Albia soil may be found in some areas on concave slopes, generally on the lower parts of hills.

2.3 DESIGN RECORDS

The records available for the project consist of a plan and profile drawing, dated 1964, and a topographic and location map, dated 1978. No other design records are available for either the original design or the redesign.

2.4 CONSTRUCTION RECORDS

No records for either the original construction or the reconstruction of the project were available.

According to Mr. Signore, an additional outlet pipe (possibly 30-inch diameter) is to be installed within the dam. The upstream invert elevation would be 209 feet. Preparations for this work were being made at the time of this inspection.

2.5 OPERATION RECORDS

According to Mr. Matt Soyka, Assistant Superintendent of Public Works, there are no operation records for the project.

2.6 EVALUATION OF DATA

The data which exists for the project is limited. A complete set of correspondence between the office of the N.Y.S. Department of Environmental Conservation and the Engineer's Office of the City of Poughkeepsie concerning additional inspections and recommended modifications is available (see Appendix E). The information available appears to be adequate and reliable for the purpose of the Phase I inspection.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of Morgan Lake Dam was made on 24 April 1980. The weather was clear and the temperature about sixty degrees. At the time of the inspection, the lake level was about 2 inches above the spillway invert elevation.

b. Dam. The overall condition of the dam is poor. The upstream slope of the dam has vegetation consisting of small to large trees. No slope protection exists on the upstream face and erosion has occurred apparently due to wave action. In places the erosion has advanced to the shoulder of the roadway. The downstream slope is covered with debris, including household appliances, tires, etc., and small shrubs to large trees 24 inches in diameter (Figures 1 and Overview).

The horizontal alignment of the dam appears to be good. The vertical alignment is good, except at the left abutment where the crest is depressed about 2 to 3 feet. The topographic map on Plate 3 shows the depressed crest area at El 213.

The gravel-asphalt roadway along the crest of the dam appears to be in good condition (Figure 2).

Some minor sloughing has occurred along the downstream slope exposing large tree root systems. Extensive areas of dampness were detected halfway up the downstream slope, which may be the result of minor seepage (Figure 1). Several areas along the toe also appeared wet with standing water which may be the result of seepage or runoff.

c. Spillway. The 30-inch diameter RCP appears to be in good condition. At the time of this inspection, a small leak was observed beneath the outlet. This is probably due to porous-type or poorly compacted materials surrounding the pipe (Figure 3).

The upstream approach channel contains debris and timber. The sidewalls of the channel contain low brush, and are unprotected (Figure 4).

d. Appurtenant Structures. The reservoir drain could not be located during this inspection due to existing vegetation. According to Mr. Signore, the downstream drain valve which regulates discharge has been inoperable for many years.

e. Downstream Channel. The spillway downstream channel is in poor condition (Figure 5). Debris was found to exist along the channel length. Immediately downstream of the pipe, the side slopes are relatively steep and contain large trees. Channel flow is diverted along the toe of the embankment, which could cause erosion and resulting slope instability (Figure 6).

f. Reservoir. The reservoir is bounded by a railroad embankment to the north, a highway embankment and park to its east, and gently steeping slopes to the west. No signs of slope instability were observed in the vicinity of the dam and no floating debris were observed on the lake. Water in the lake was relatively clear.

g. Abutments. At the left abutment, seepage was noted along the contact with Creek Road. No discharge quantities could be measured, but small puddles existed in depressed pavement areas (Figure 7). According to Mr. Soyka, this condition has existed for a few years. (Also see correspondence in Appendix E).

No seepage was detected at the right abutment contact.

3.2 EVALUATION OF OBSERVATIONS

Significant conditions were observed which require immediate investigation to determine the extent of corrective action necessary to determine the stability of the dam and appurtenances. The following is a summary of the problem areas encountered, in order of importance, with the appropriate recommended action:

1. The seepage occurring along the downstream slope, at the toe, and at the left abutment contact must be investigated immediately. Construction of weirs and monitoring of flow at bi-weekly intervals should be performed to determine the nature and extent of the seepage.

2. The downstream spillway channel must be realigned so that it does not flow along the downstream toe of the embankment.

3. The leakage beneath the spillway pipe should be controlled.

4. Heavy brush, shrubs, trees and debris must be removed from all locations on the embankment and in the spillway channel. Provide a program of periodic cutting and mowing of the embankment surfaces and spillway channel.

5. Provide riprap along the upstream face of the dam.

6. Repair the outlet controls of the reservoir drain.

7. Develop an emergency action plan.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. The normal operation of the project consists of allowing water to flow through the spillway outlet pipe. The reservoir drain is inoperable.

4.2 MAINTENANCE OF DAM

Based on the visual inspection reported herein, the project is inadequately maintained.

4.3 MAINTENANCE OF OPERATING FACILITIES

The regulating control valve for the low level outlet pipe has not been operable for many years. There is believed to be no maintenance of this facility.

4.4 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.5 EVALUATION

The dam and appurtenances have not been maintained in satisfactory condition as noted in "Section 3 - Visual Inspection".

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The area of the drainage basin contributing to Morgan Lake is 480 acres (0.75 sq. miles) with a north-south orientation and a length to width ratio of about 4 to 1. The basin elevation varies from lake surface (El 211) to over El 450 in the northeastern corner of the basin. The drainage basin is approximately 80 percent developed and has very little storage, although it is estimated that storm sewers would drain some of the runoff away from the lake and out of the basin.

5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity was performed using the Computer program "Flood Hydrograph Package (HEC-1) for Dam Safety Inspections" (Ref. 1). The Probable Maximum Precipitation (PMP) for the Poughkeepsie area was taken from Weather Bureau Sources (Ref. 4) and distributed by the standard EM-1110-2-1411 method (Ref. 3). A unit hydrograph, developed for a nearby similar basin (Ref. 2), was transposed to the Morgan Lake basin and these computed ordinates were input directly. It was assumed that there would be an initial rainfall loss of 2 inches and that the constant loss rate would be 0.05 inches/hour.

5.3 SPILLWAY CAPACITY

The spillway of the dam consists of a 30-inch diameter concrete pipe, approximately 20 feet long, located near the right abutment. The invert of the pipe is approximately 5 feet below the crest of the dam at the outlet.

The spillway channel immediately downstream of the pipe is approximately 5 feet wide at its floor and has a height of about 9 feet. The floor and the sides of this section of channel are protected with stone and boulders.

According to Mr. Signore, an additional 30-inch diameter outlet pipe is to be installed within the dam, so that the lake level could be maintained 2 feet below its present level. Preparations for this work were being made at the time of this inspection. It was therefore considered appropriate to include the capacity of both spillways in the hydraulic analysis. The combined maximum capacity of both pipes at El 1213 is 130 cfs.

5.4 RESERVOIR CAPACITY

The reservoir impounded by this lake is called Morgan Lake. The original storage capacity of the lake was reduced when part of the lake was developed north of the railroad. It is estimated that at invert elevations 211 feet and 209 feet, the storage capacity is 56 and 33 acre-feet, respectively.

5.5 FLOODS OF RECORD

There are no records of floods or maximum lake elevations for the project, however, it has been reported that the dam had been overtopped in the past at the left abutment contact (see Appendix E).

5.6 OVERTOPPING POTENTIAL

The potential of the dam being overtopped was investigated on the basis of spillway discharge capacity and the available surcharge storage to meet the selected design flood inflows. In this analysis, it is assumed that the additional 30-inch diameter spillway pipe was installed at approximate El 209 and is operating satisfactorily.

The Probable Maximum Flood (PMF) routed through the lake caused the lake surface to rise to El 216.2, which is approximately 3.2 feet above the low crest elevation (213 feet) of the dam. The computed PMF peak inflow and outflow discharges were 1906 cfs and 1875 cfs, respectively. The one-half PMF routed through the lake caused the lake surface to rise to El 214.7, or approximately 1.7 feet above the top of dam. The peak outflow discharge was 856 cfs.

Using the Corps of Engineers criteria, the maximum spillway capacity without overtopping the dam is 5 percent of the PMF peak outflow.

5.7 EVALUATION

The dam, even when both 30-inch pipes are considered, can pass 5 percent of the peak PMF outflow without overtopping. The overtopping could cause the failure of the dam, thus significantly increasing the hazard to loss of life downstream.

The spillway, therefore, is adjudged as "seriously inadequate", and the dam is assessed as unsafe.

SECTION 6 - STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS

No signs of major distress were observed in connection with the earth embankment or the spillway pipe. However, seepage was observed at the left abutment, at the downstream toe and slope, and beneath the spillway outlet pipe. In addition, the downstream slope of the dam is steep and shows signs of sloughing, the downstream spillway channel extends along the toe of the dam, and erosion has occurred along the unprotected upstream face. These conditions are considered hazardous.

6.2 DESIGN AND CONSTRUCTION DATA

There exists no design computations or other data regarding the structural stability of the dam.

6.3 OPERATING RECORDS

There are no operating records kept. Reports are available which indicate recommendations concerning structural stability of the dam (see Appendix E).

6.4 POST-CONSTRUCTION CHANGES

According to available documents, the dam was originally built in 1868. Modifications were performed to the dam thereafter, and consisted of the installation of a new spillway pipe and the performance of embankment work adjacent to the highway. The date these modifications were performed is unknown.

6.5 SEISMIC STABILITY

In accordance with recommended Phase I guidelines, the dam is located in Seismic Risk Zone 1. However, based on past local seismic experience, the New York State Geological Survey recommends that the damsite is to be considered in Zone 2. In accordance with the guidelines, no seismic analyses are warranted for an earth structure.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I inspection of Morgan Lake Dam revealed that the spillway is "seriously inadequate", based upon the Corps of Engineers screening criteria, and outflows from any storm in excess of 5 percent of PMF peak outflow will overtop the dam. This overtopping could cause breaching of the dam and the resulting flood wave would significantly increase the hazard to downstream residents. For these reasons, the dam has been assessed as unsafe, non-emergency.

In addition, the dam has a number of deficiencies which if left uncorrected, have the potential for the development of hazardous conditions. These deficiencies are:

1. Seepage at the toe, left abutment and along the downstream slope.
2. Leakage beneath the spillway pipe.
3. Low crest elevation at the left abutment.
4. Downstream spillway channel extends along the toe of the dam.
5. Erosion of the unprotected upstream slope.
6. Steepness and sloughing of the downstream slope.

b. Adequacy of Information

The information reveiwed is considered adequate for a Phase I investigation.

c. Need for Additional Investigations

Since the spillway is considered to be "seriously inadequate", additional hydrologic/hydraulic investigations are required to more accurately determine the site specific characteristics of the watershed. After the in-depth hydrologic/hydraulic investigations have been completed, remedial measures must be initiated to provide spillway capacity sufficient to discharge the outflow from the one-half PMF event. In addition, field and laboratory investigations should be performed to

determine subsoil conditions, soil parameters, and the nature of the embankment and abutment seepage. A stability analysis should be performed to determine whether the dam is structurally stable during design flood conditions.

d. Urgency

The additional hydrologic/hydraulic investigations and the stability investigation which are required must be initiated within 3 months from the date of notification. Within 1 year of notification, remedial measures as a result of these investigations must be initiated, with completion of these measures during the following year. In the interim, develop an emergency action plan for the notification of downstream residents and proper governmental authorities in the event of overtopping and provide around-the-clock surveillance of the dam during periods of extreme runoff. The other problem areas listed below must be corrected within 1 year from notification.

7.2 RECOMMENDED MEASURES

1. Results of the aforementioned investigations will determine the type and extent of remedial measures required.

2. The seepage occurring along the downstream slope, at the toe, and at the left abutment contact should be monitored and observations recorded. Construction of weirs and monitoring of flow at bi-weekly intervals should be performed to properly ascertain the nature of the seepage.

3. The downstream spillway channel should be realigned so that it does not flow along the downstream toe of the dam, and cause erosion under high flows.

4. The leakage beneath the service spillway outlet pipe should be controlled.

5. Heavy brush, shrubs, trees and debris should be removed from all locations on the embankment and in the spillway channel. Provide a program of periodic cutting and mowing of the embankment surfaces and spillway channel.

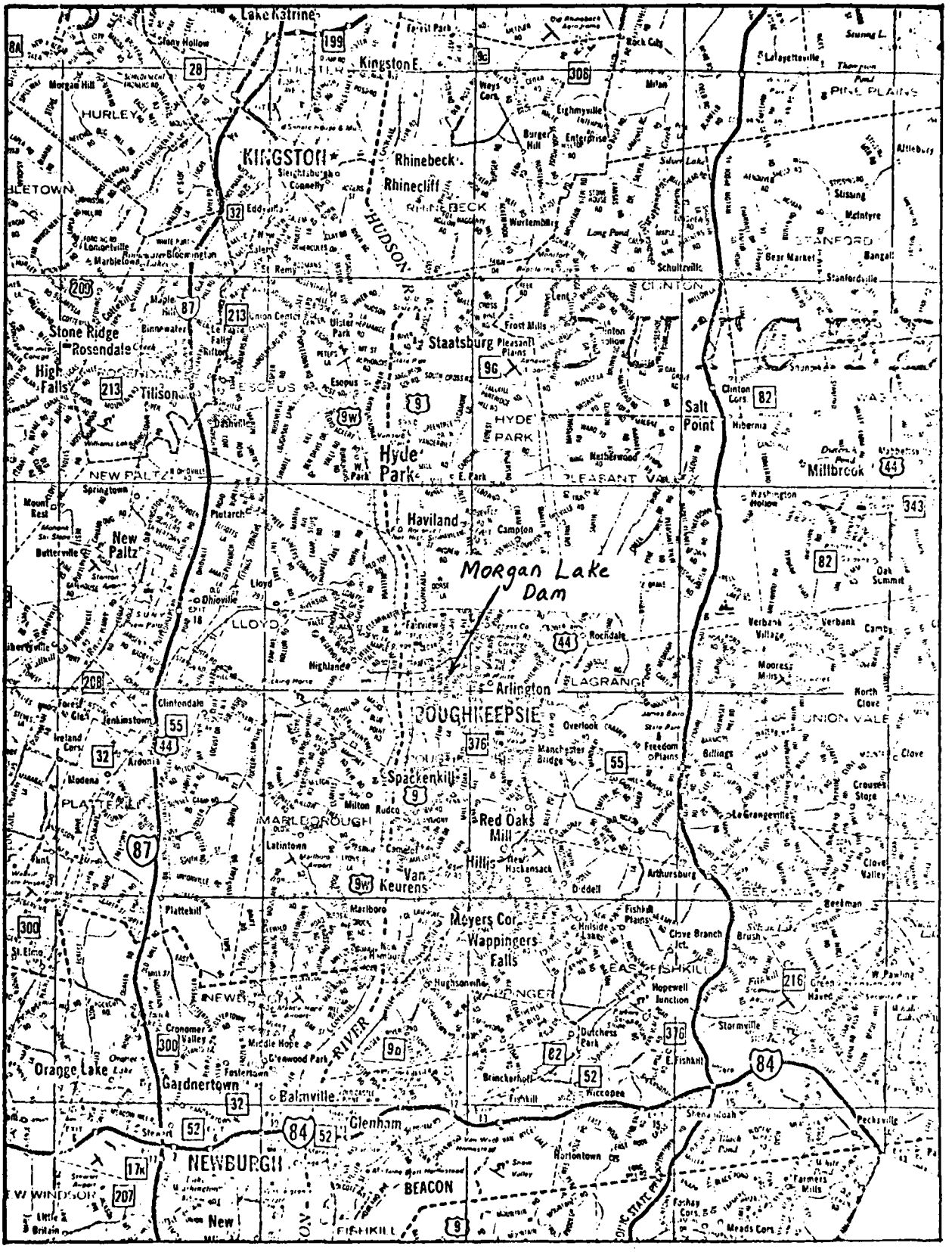
6. Riprap should be installed along the upstream face of the dam to prevent future erosion due to wave action.

7. The reservoir drain and its controls should be made operable.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically during the life of the structure.

APPENDIX A

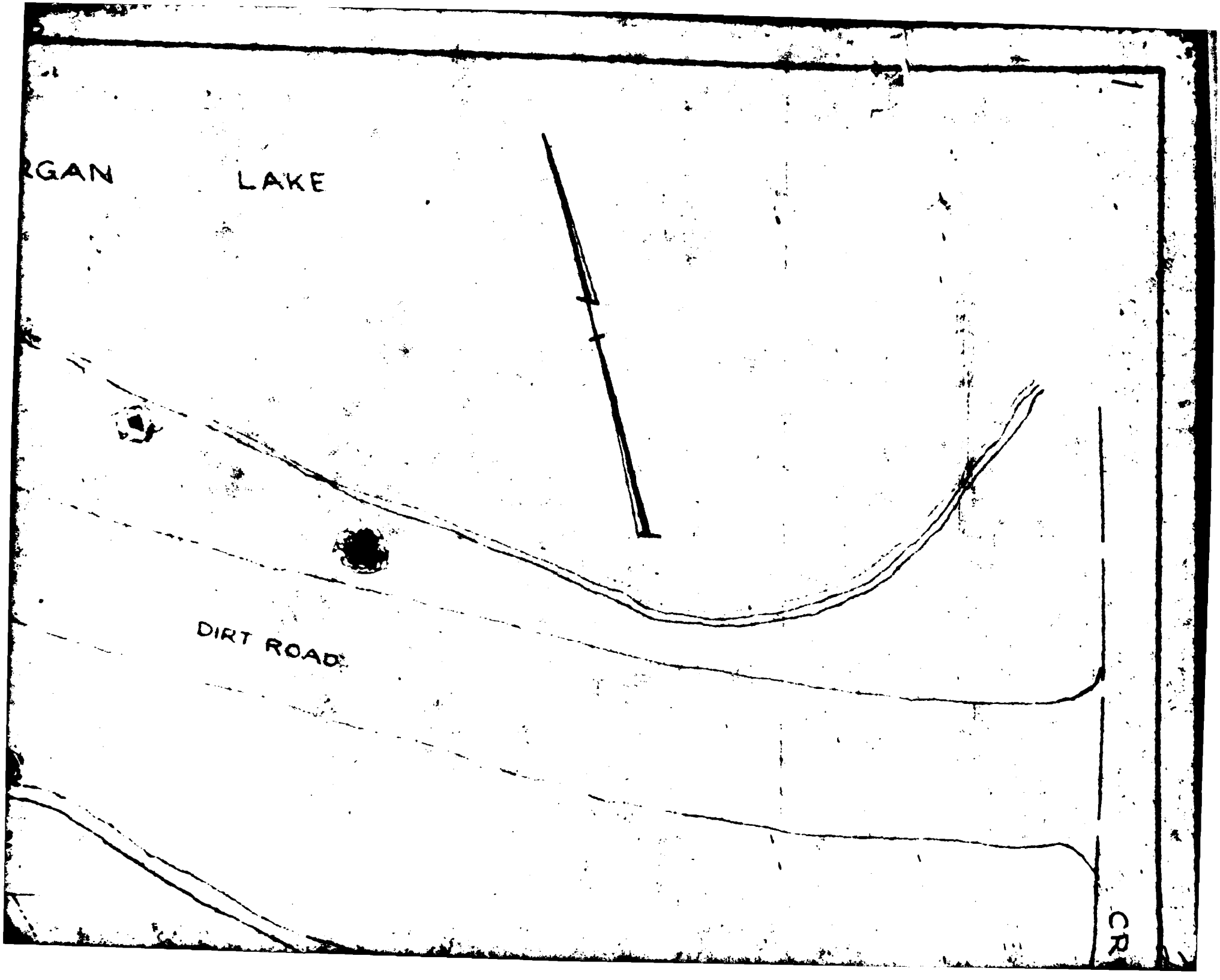
PLATES

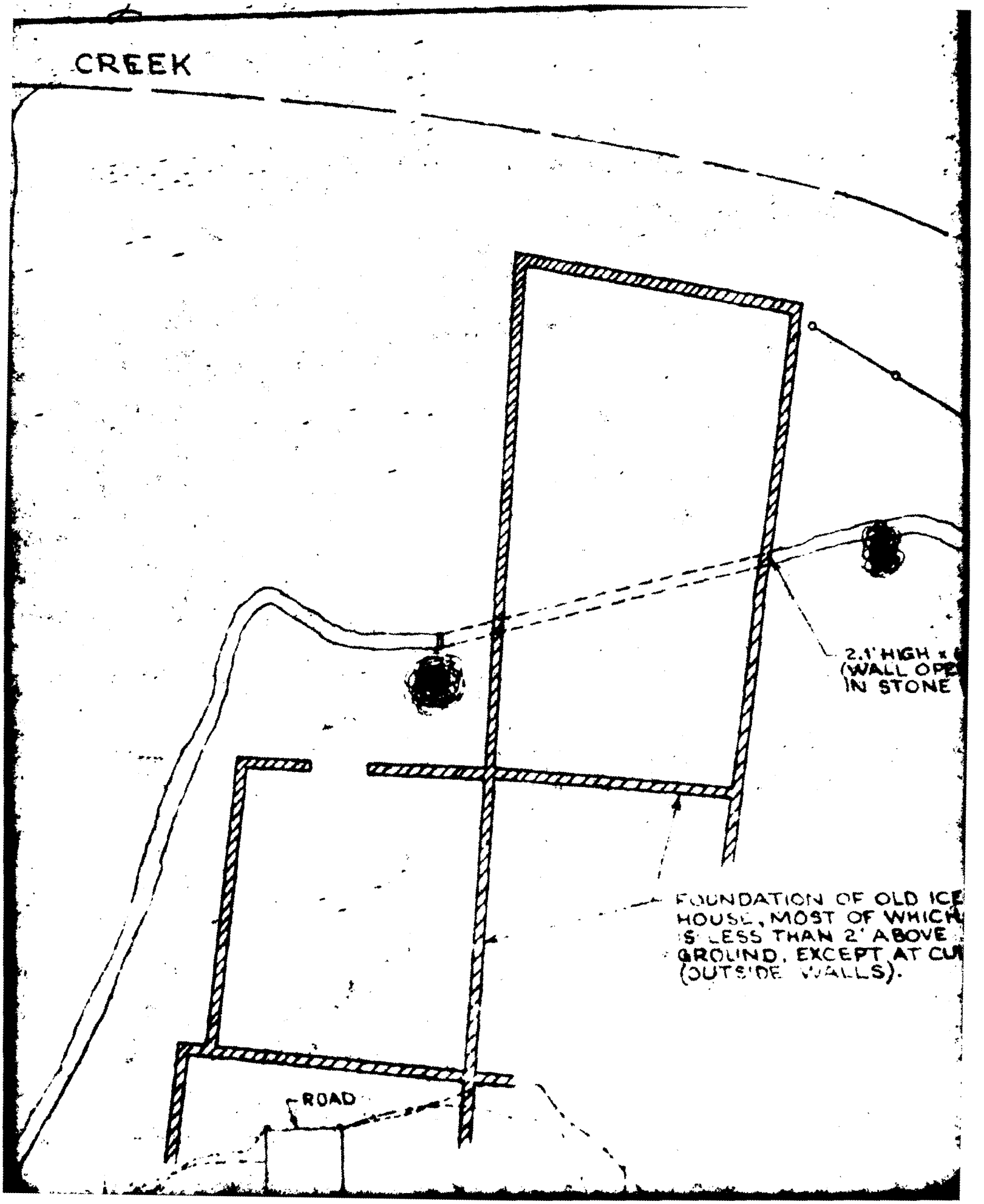


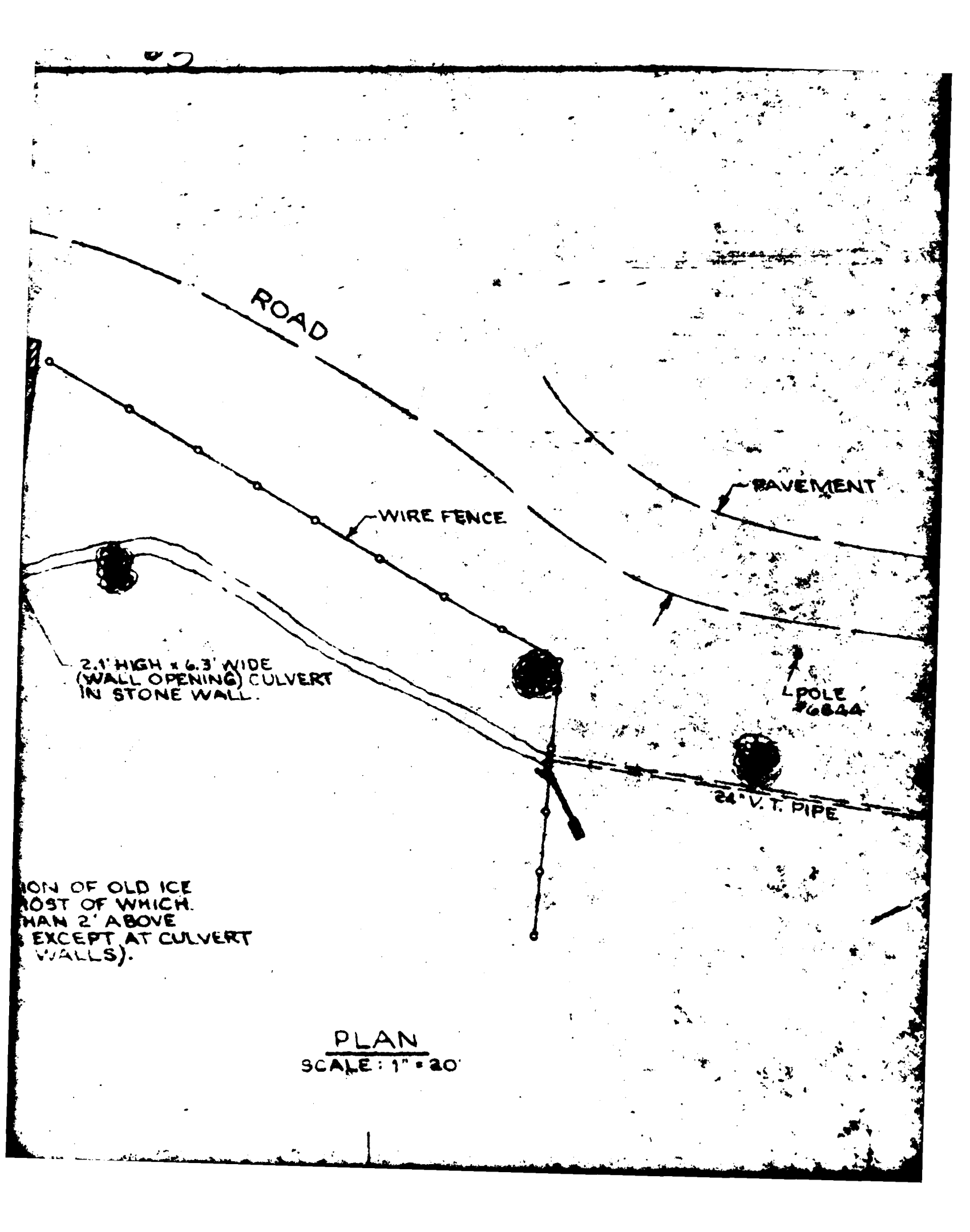
APPROXIMATE SCALE

0 2 4 6 8 MILES

MORGAN LAKE DAM
LOCATION MAP
PLATE NO. 1

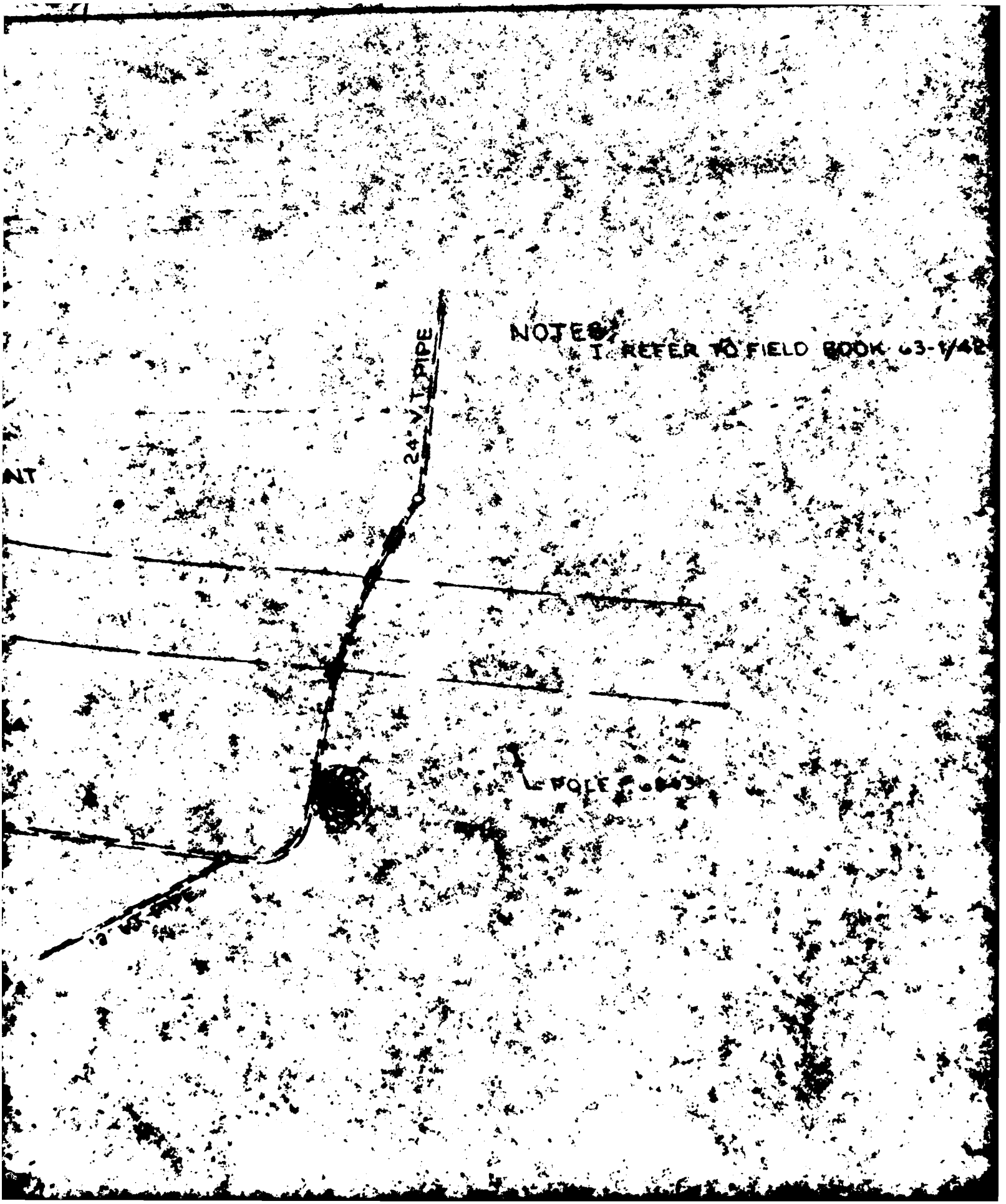

RGAN
LAKE
DIRT ROAD
CR


CREEK
2.1' HIGH x
(WALL OPE
IN STONE
FOUNDATION OF OLD ICE
HOUSE, MOST OF WHICH
IS LESS THAN 2' ABOVE
GROUND, EXCEPT AT CU
(OUTSIDE WALLS).
ROAD



PLAN

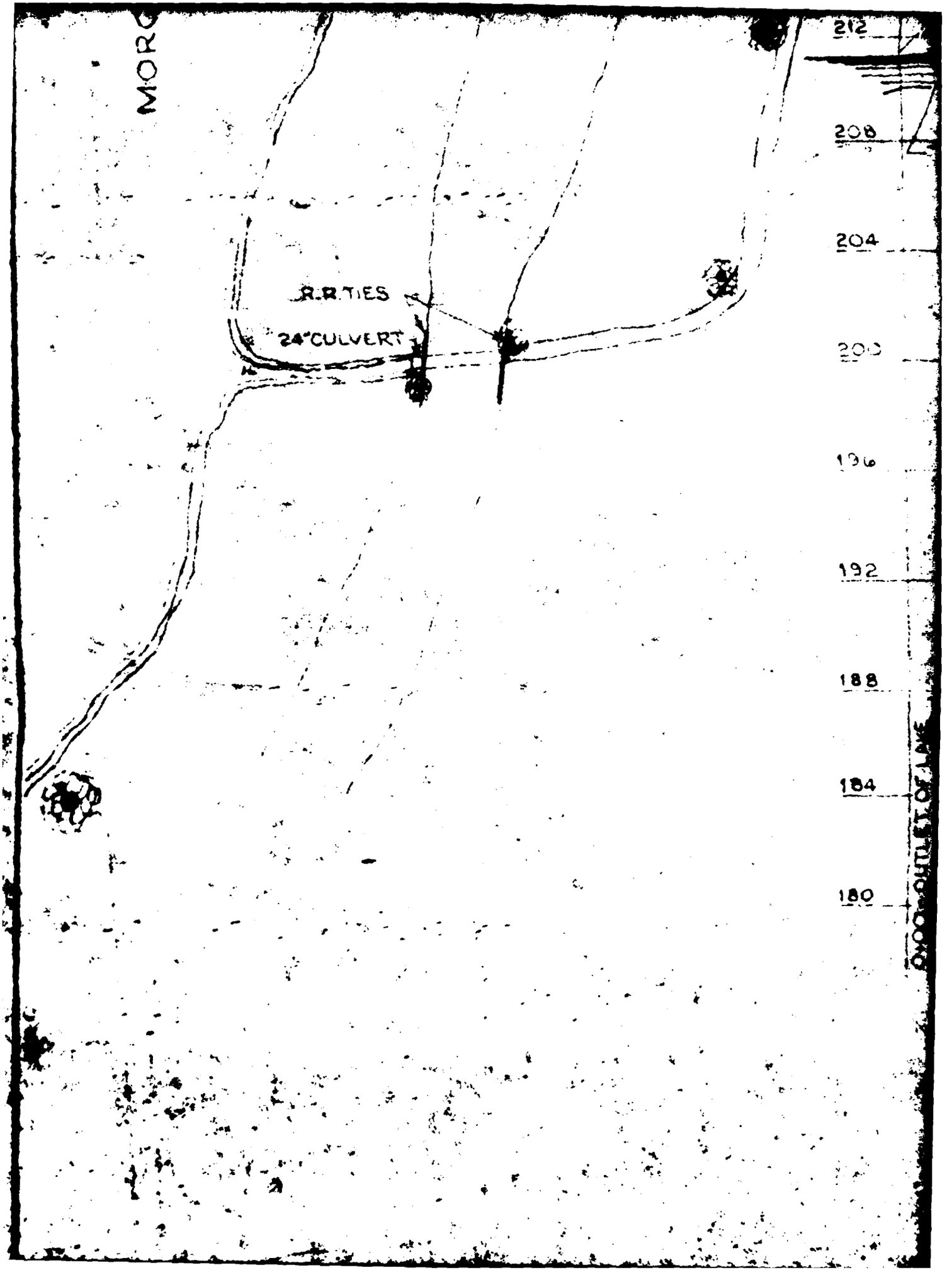
SCALE: 1" = 20'

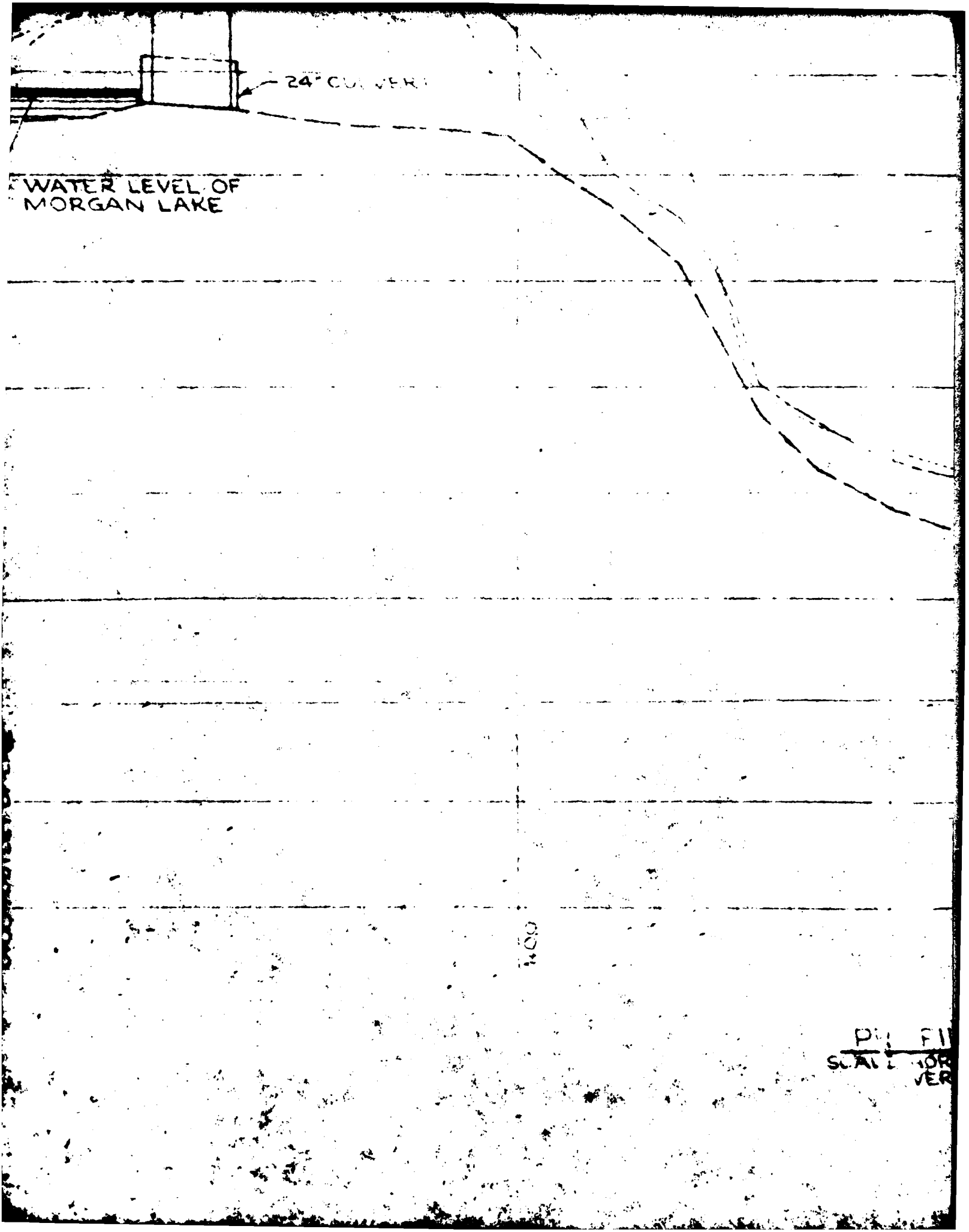

NOTES:
I. REFER TO FIELD BOOK 63-1/42
24" V.T. PIPE
POLE

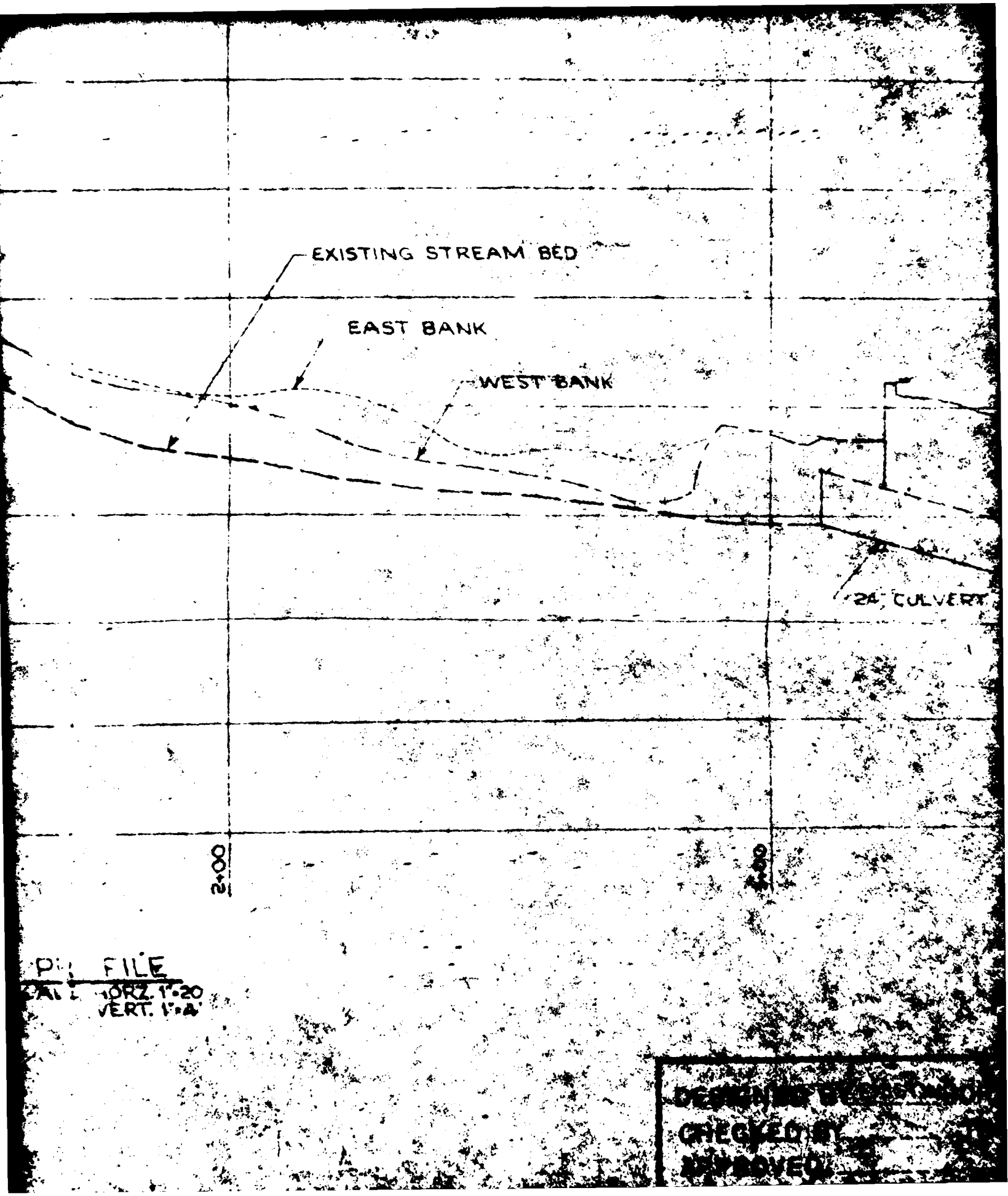
NOTES:
1. REFER TO FIELD BOOK 63-1/42-46

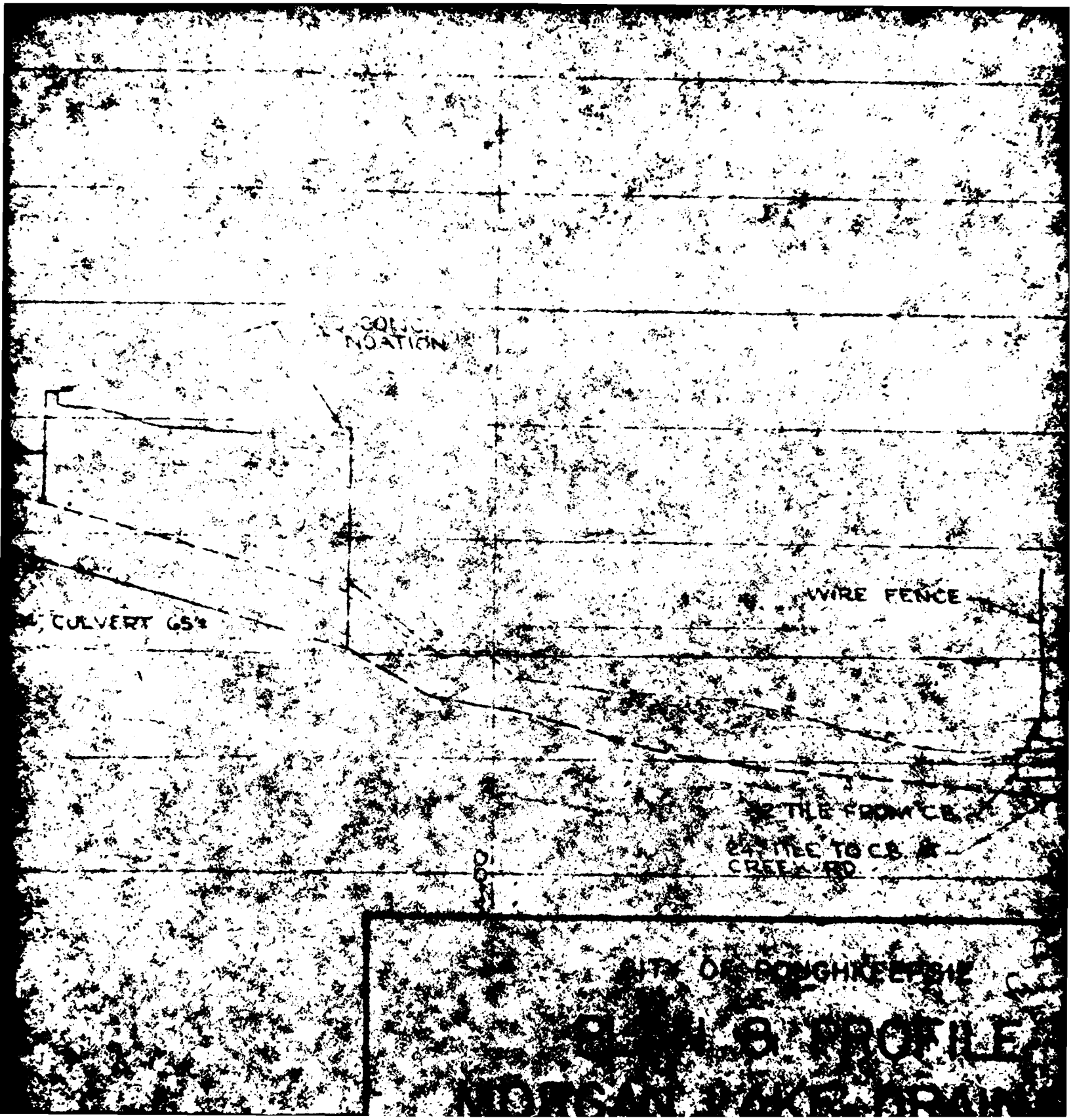
24" V.T. PIPE

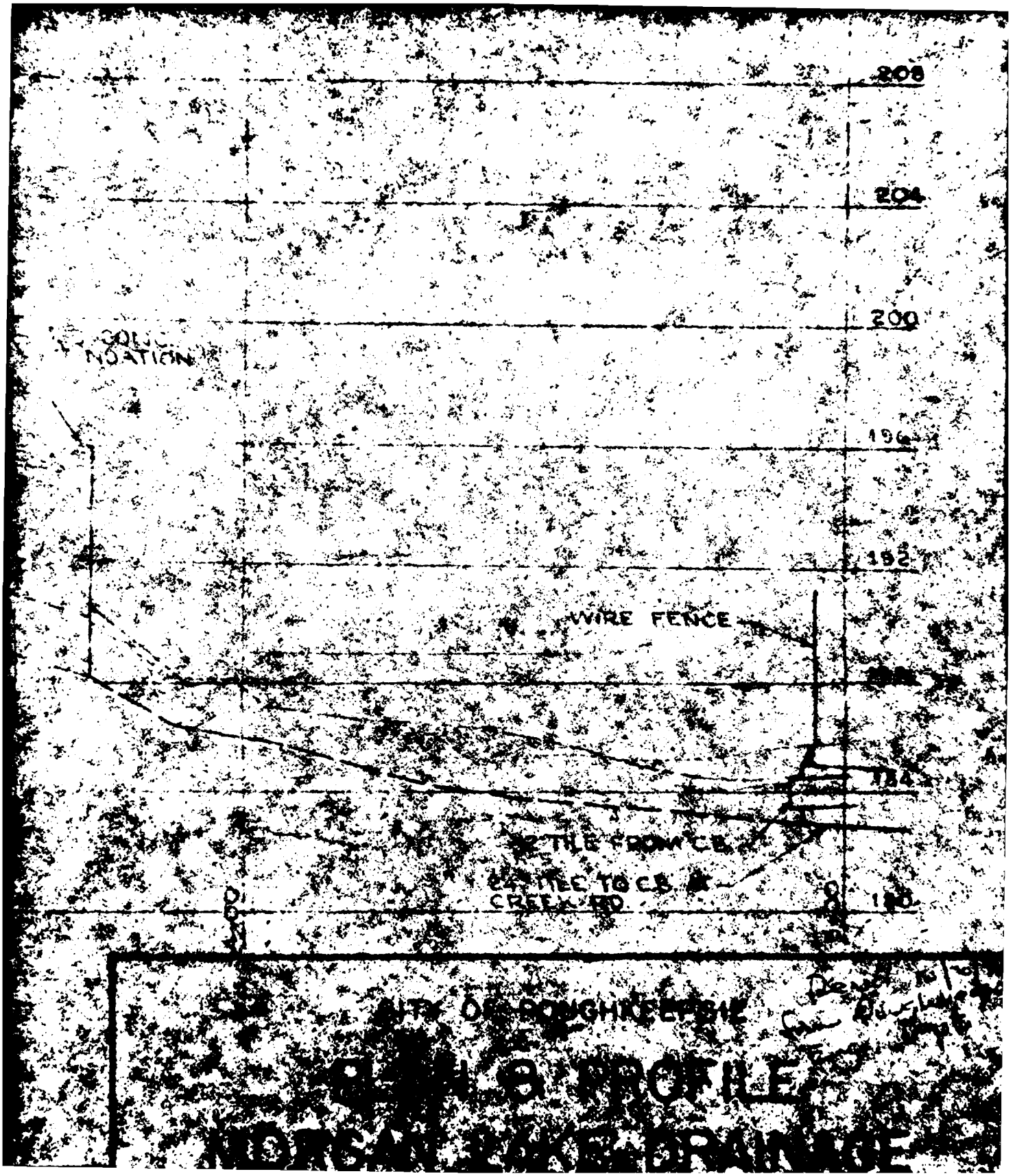
POLE

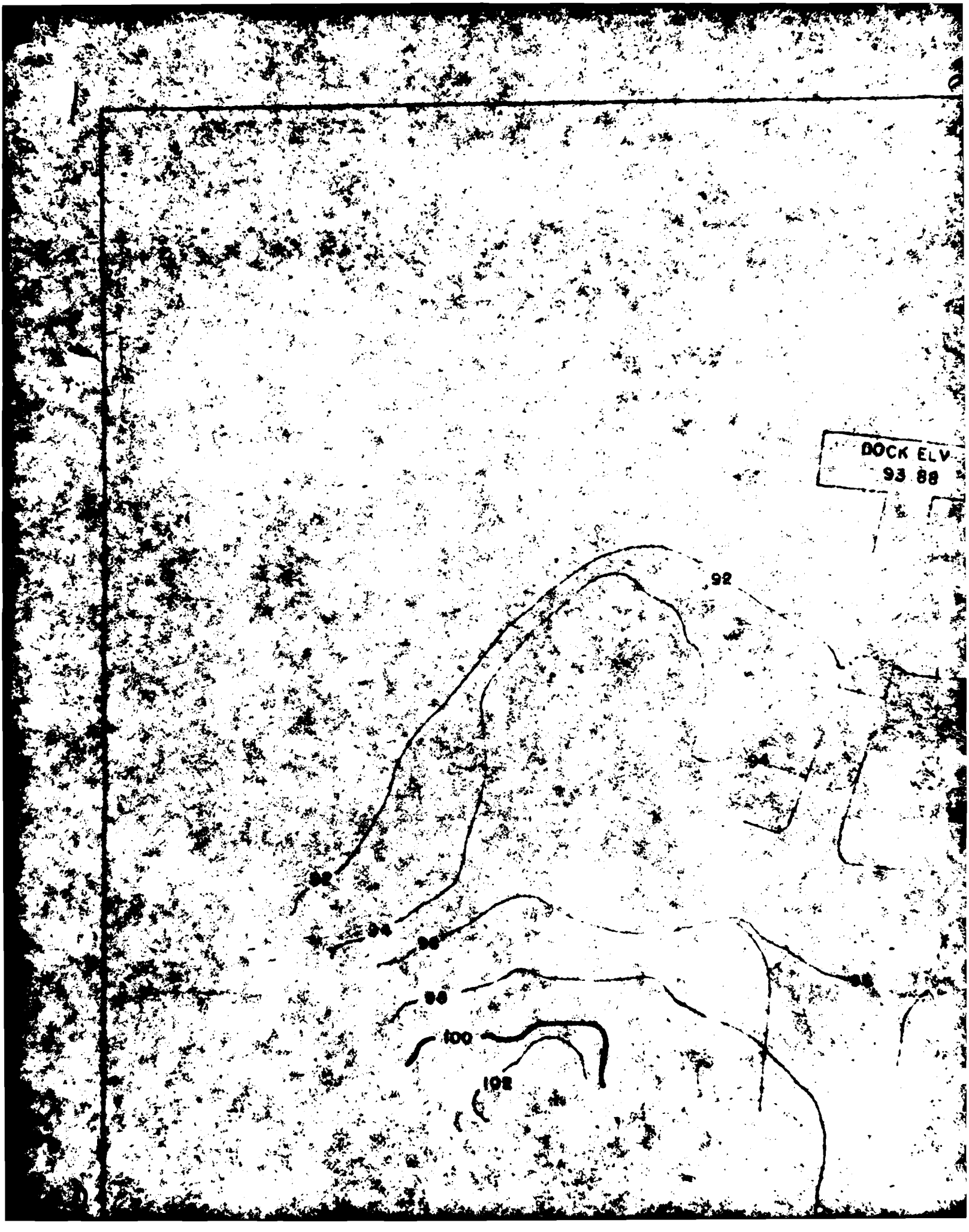

MORG
R.R.TIES
24"CULVERT
212
208
204
200
196
192
188
184
180
OUTLET OF LAKE


24" CULVERT
WATER LEVEL OF
MORGAN LAKE


EXISTING STREAM BED
EAST BANK
WEST BANK
24" CULVERT
2+00
FILE
HORZ. 1"=20'
VERT. 1"=4'

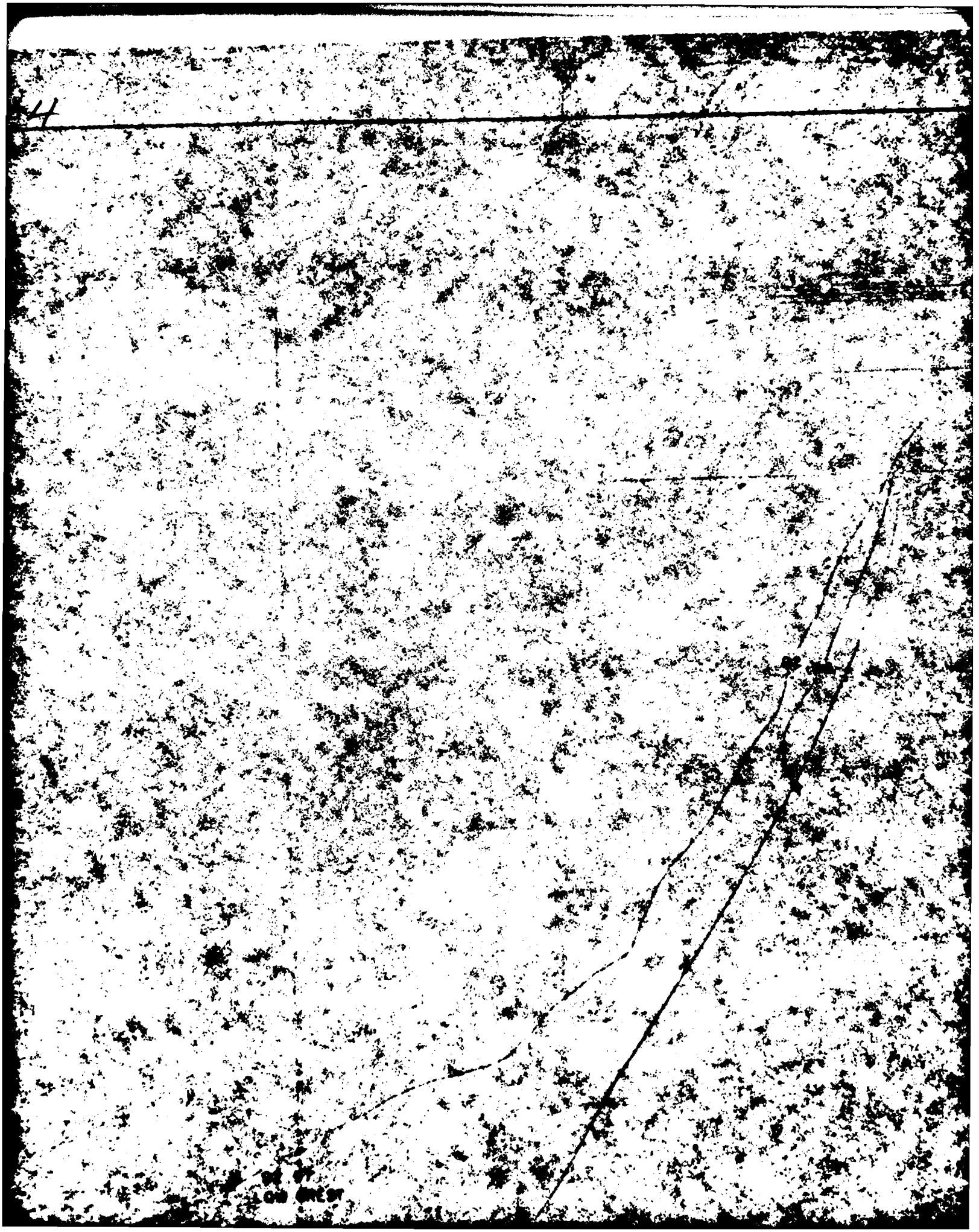

CULVERT 65'
WIRE FENCE
24" TILE TO C.B.
CREEK RD.

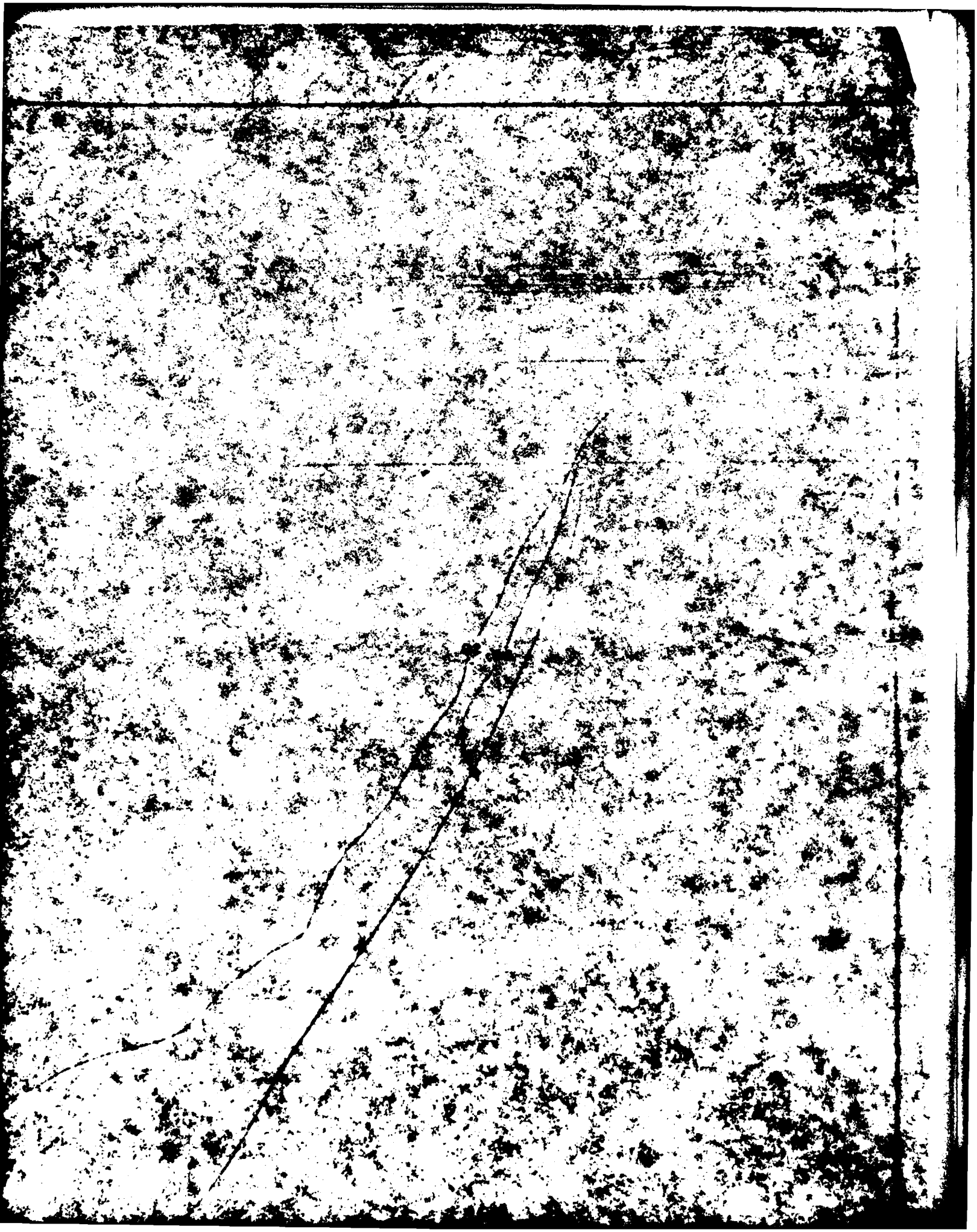

208
204
200
196
192
188
184
180
WIRE FENCE
CATTLE CROSSING
CATTLE TO C.S. CREEK
PROFILE

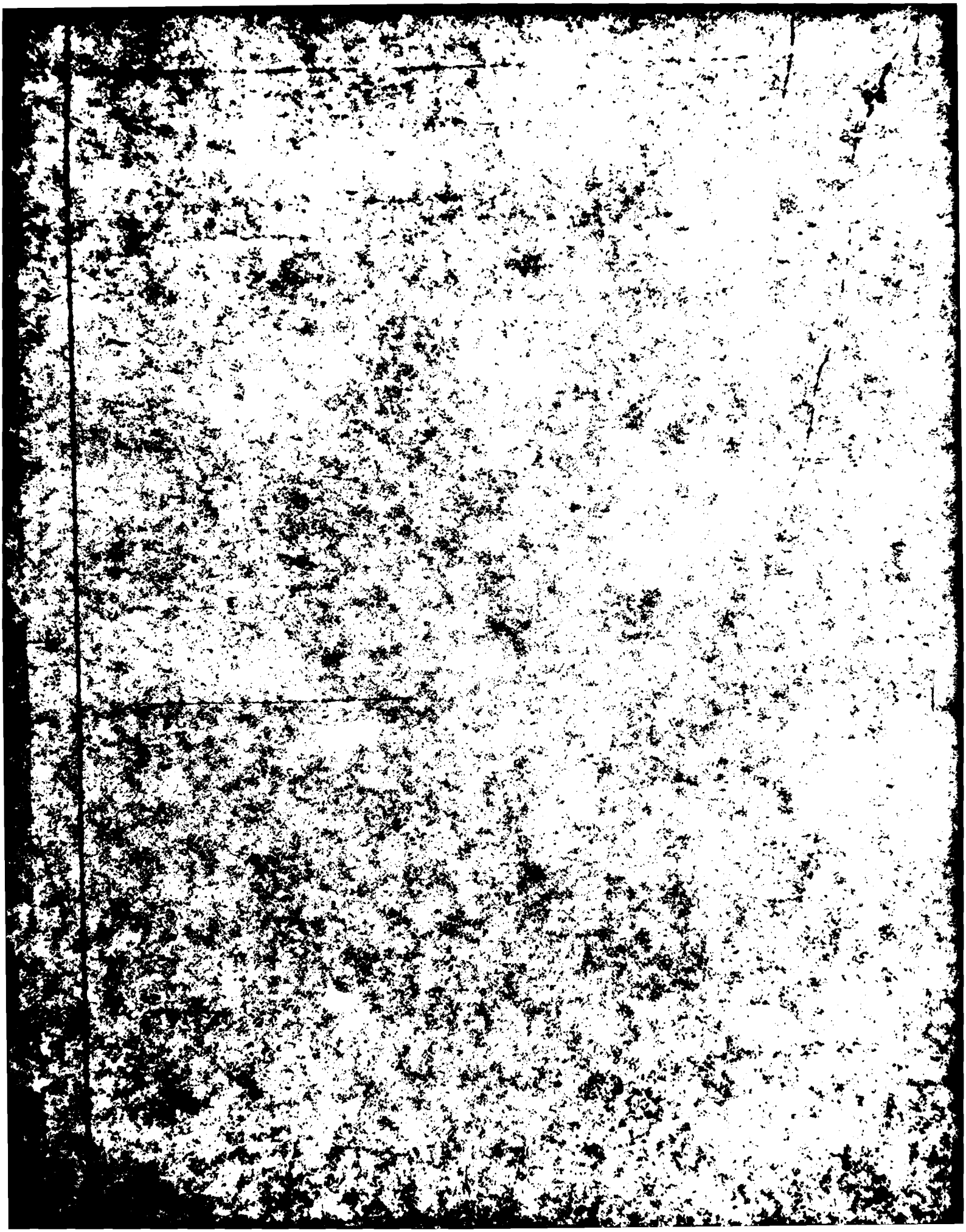

DOCK ELV
93 88
92
100
102

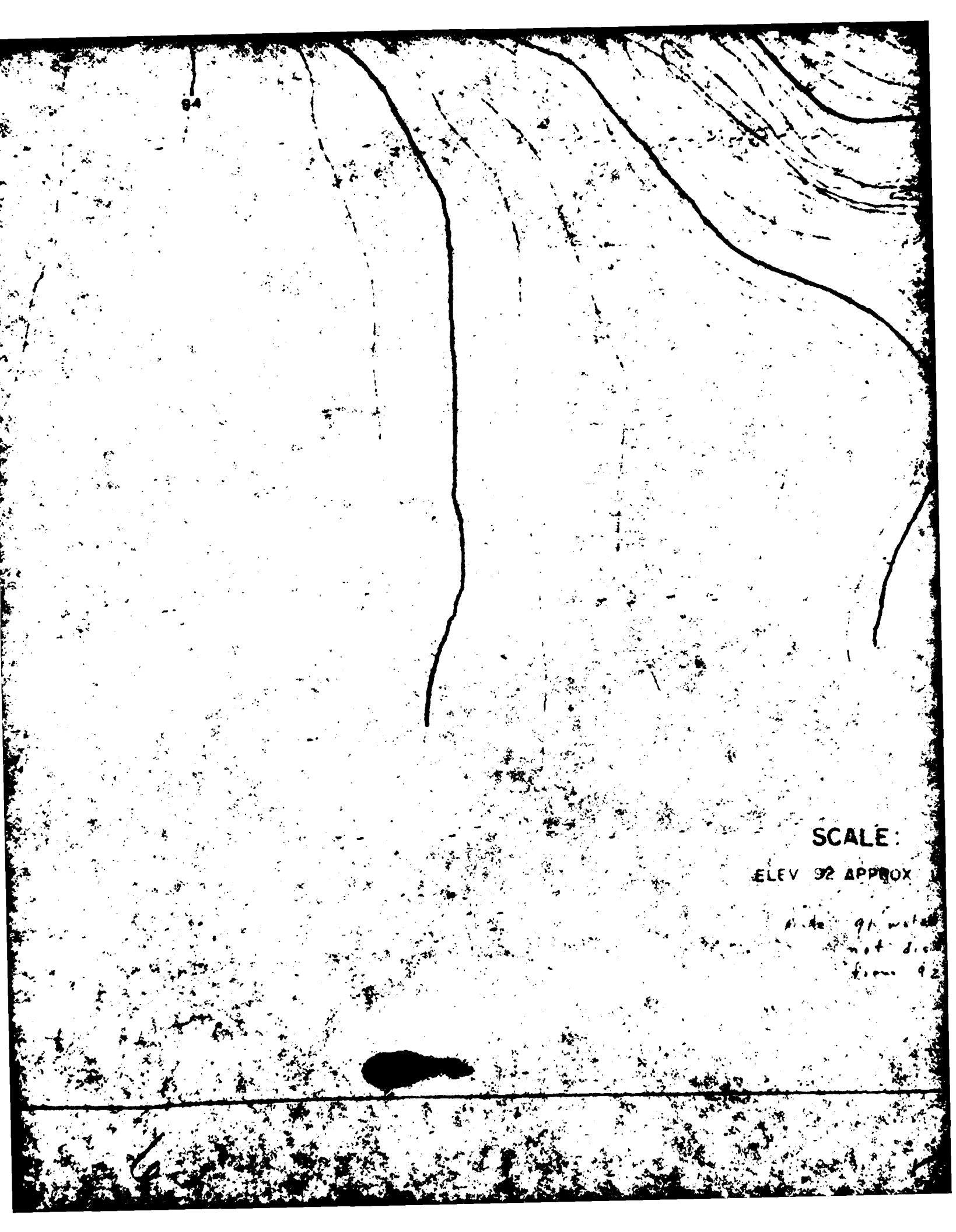

N
BOCK ELV
93 88

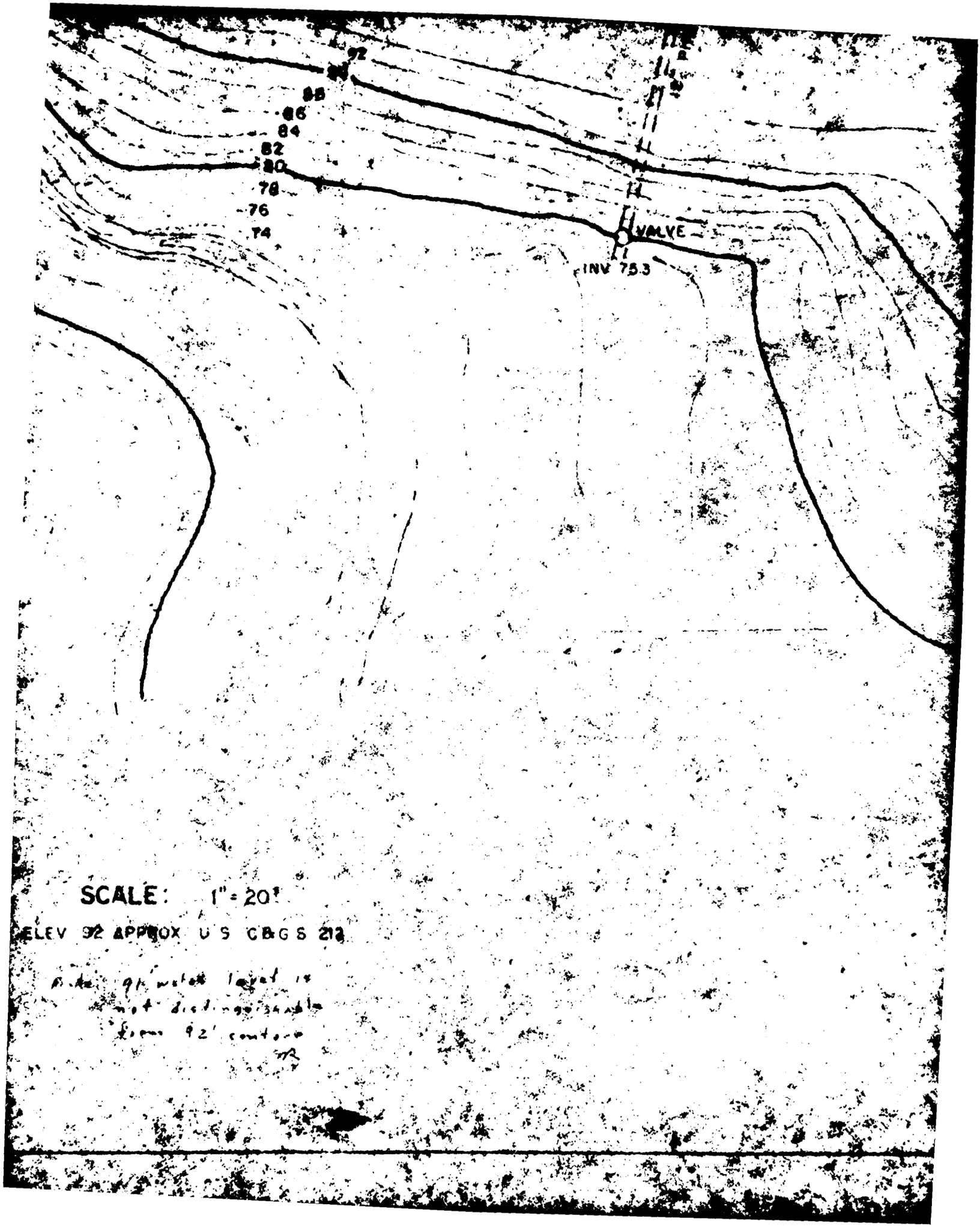
MORGAN LAKE

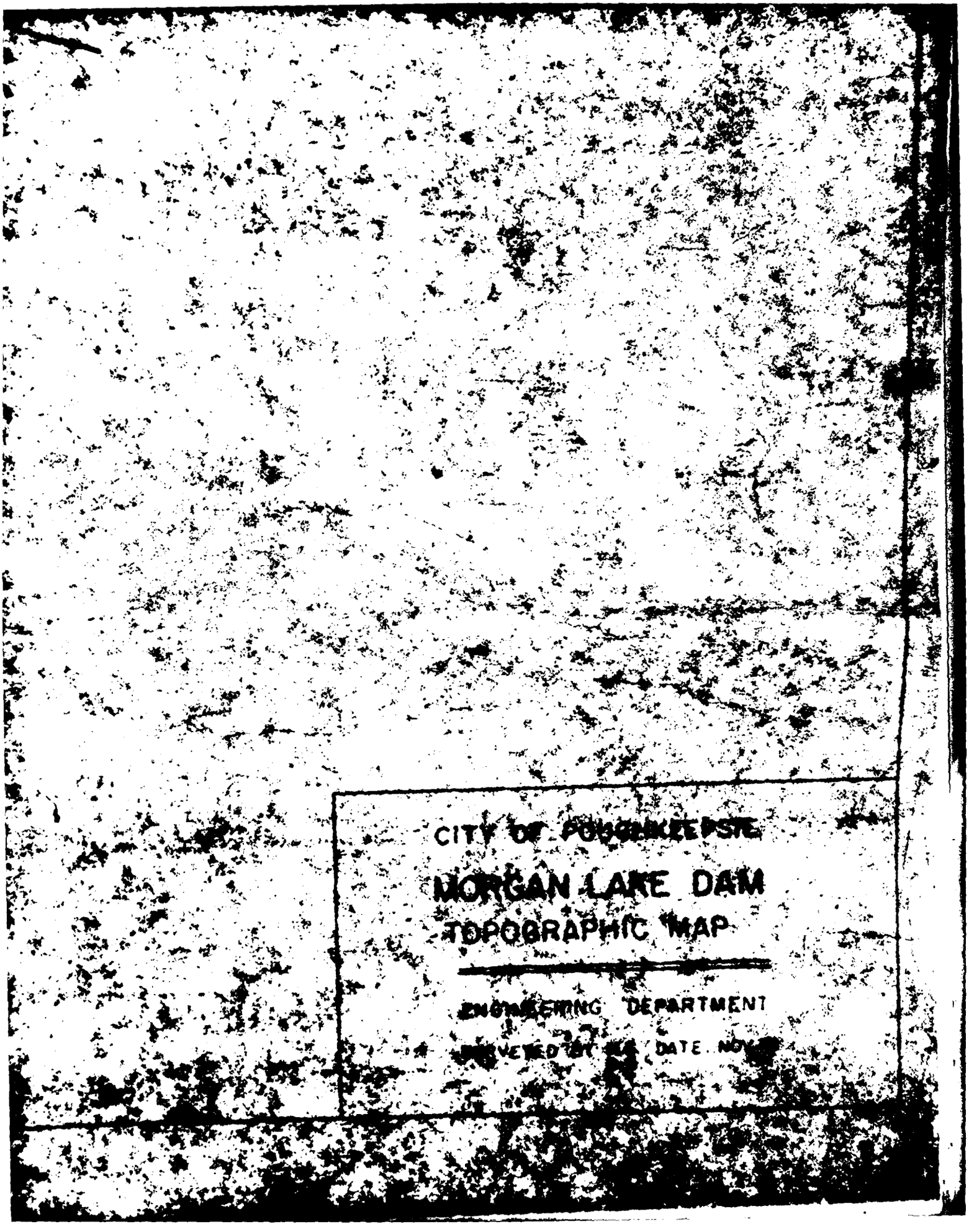







94
SCALE:
ELEV 92 APPROX


92
88
86
84
82
80
78
76
74
VALVE
INV 75.3
SCALE: 1" = 20'
ELEV 92 APPROX U S C&G S 213
Note: ground water level is
not discernable
from 92' contour

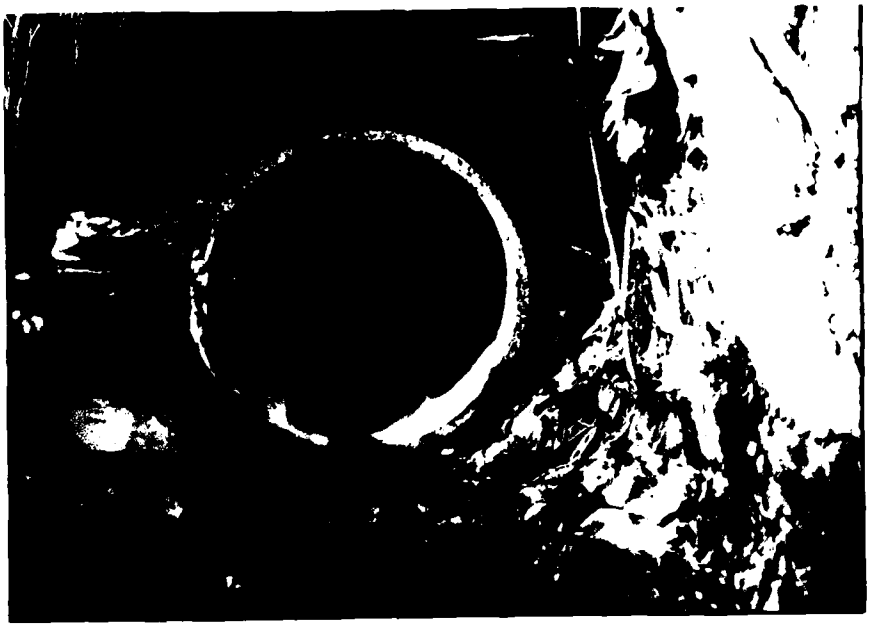

CITY OF POUGHKEEPSIE
MORGAN LAKE DAM
TOPOGRAPHIC MAP
ENGINEERING DEPARTMENT
SURVEYED BY
DATE NOV

APPENDIX B

PHOTOGRAPHS

1. DOWNSTREAM SLOPE. NOTE DEBRIS AND SWAMP-TYPE VEGETATION.

2. CREST ROADWAY (LOOKING EASTWARD).



3. 30-INCH DIAMETER SERVICE SPILLWAY PIPE. (DOWNSTREAM VIEW).

4. UPSTREAM APPROACH CHANNEL TO SERVICE SPILLWAY.

5. VIEW OF DOWNSTREAM SPILLWAY CHANNEL.

6. VIEW OF DOWNSTREAM SPILLWAY CHANNEL ALONG TOE OF EMBANKMENT.

7. MINOR SEEPAGE ALONG LEFT ABUTMENT CONTACT WITH ROADWAY

APPENDIX C

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Morgan Lake DAM

Fed. I.D. # N.Y 787 DEC Dam No. 685

River Basin Lower Hudson River VALLEY

Location: Town PoughKeepsie County Dutchess

Stream Name —

Tributary of —

Latitude (N) 41° 42' Longitude (W) 73° 54'

Type of Dam Rock/Earthfill

Hazard Category HIGH

Date(s) of Inspection 24 April 80

Weather Conditions Sunny : 60-70°F

Reservoir Level at Time of Inspection 1" above Spillway invert level

b. Inspection Personnel Mr. Harvey Feldman, Mr Albert DiBernardo

c. Persons Contacted (Including Address & Phone No.)

Mr. Alfred Signore, Mr. Matt Soyka, Mr. Willard Rivenburgh

Howard Street Extension

Department of Public Works

PoughKeepsie, New York 12601 (914) 485-4700

d. History:

Date Constructed 1868 Date(s) Reconstructed

Designer UNKNOWN

Constructed By Unknown

Owner City of PoughKeepsie

2) Embankment

a. Characteristics

(1) Embankment Material Earthfill/Rockfill; classification of earthfill is unknown, however, from nearby surface deposit, may be silty sandy clay with boulders.

(2) Cutoff Type Unknown

(3) Impervious Core Unknown

(4) Internal Drainage System Unknown

(5) Miscellaneous None

b. Crest

(1) Vertical Alignment Good, except where crest roadway descends to Smith Street

(2) Horizontal Alignment Good

(3) Surface Cracks Crest paved with gravel and asphalt

(4) Miscellaneous None

c. Upstream Slope

(1) Slope (Estimate) (V:H) Top 2', near vertical; below water line, relatively flat (could not be measured due to water level)

(2) Undesirable Growth or Debris, Animal Burrows Small to large trees exist along crest.

(3) Sloughing, Subsidence or Depressions Entire slope has been eroded to some degree. In some locations, erosion has cut to crest of roadway.

(4) Slope Protection NONE, which resulted in erosion of the upstream slope, which in some areas extends to the roadway pavement

(5) Surface Cracks or Movement at Toe Unobservable - below water level.

d. Downstream Slope

✓

(1) Slope (Estimate - V:H) 1 : 1½ (see profile on plans)

(2) Undesirable Growth or Debris, Animal Burrows Very many large trees upto 24" in diameter, young trees, shrubs, bushes, garbage exists on slopes

(3) Sloughing, Subsidence or Depressions Minor sloughing exposing tree root systems. No subsidence or depressions were observed

(4) Surface Cracks or Movement at Toe Where observable, none exist

(5) Seepage Extensive dampness on downstream slope up to elevation shown below water level, but no observable running water. Swamp cabbage was observed at wet area locations.

(6) External Drainage System (Ditches, Trenches; Blanket) Spillway outlet channel flows along toe of slope on right side of dam.

(7) Condition Around Outlet Structure Outlet structure is not observable and not operable. Located in area of seepage as described below.

(8) Seepage Beyond Toe Standing water exists along downstream toe, area is very wet and swampy.

e. Abutments - Embankment Contact

On left abutment - Smith Street contact. Natural slope exists on right-side.

(1) Erosion at Contact None was observed

(2) Seepage Along Contact left Abutment contact has minor seepage with no measurable flow. Puddles exist at surface of pavement. According to the Assistant Supervisor of Public Works this seepage has been occurring for some time

3) Drainage System

a. Description of System Appears to be none —

b. Condition of System Unknown —

c. Discharge from Drainage System Unknown —

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.) None —

5) Reservoir

a. Slopes Flat slopes, stable, highway exists at left abutment.

b. Sedimentation Could not be detected

c. Unusual Conditions Which Affect Dam NONE

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) Large housing project, gas station, major city thoroughfare (Smith Street)

b. Seepage, Unusual Growth As noted above at toe of dam; extensive growth including the type of vegetation which grow in extremely damp environments

c. Evidence of Movement Beyond Toe of Dam None was observed

d. Condition of Downstream Channel Filled with debris, i.e., garbage, tires, rocks, vegetation; channel beneath ground through unobservable pipe for approx. 50 ft, later returning to 24" ϕ vitrified clay pipe, then to municipal storm system.

7) Spillway(s) (Including Discharge Conveyance Channel)

a. General 30" ~~reinforced~~ concrete pipe located at west abutment approx 6' below crest of impoundment level. Approach to pipe consists of two 20' long x 12" ϕ logs. Logs anchored by vertically driven angle irons.

b. Condition of Service Spillway Good, except for minor leakage beneath pipe invert. Leakage estimated at less that ½ gpm.

c. Condition of Auxiliary Spillway No auxiliary spillway

d. Condition of Discharge Conveyance Channel Poor. Dimensions are 5' wide at base, 10' wide at mid-height, and 9' high. Length of channel is 20' before 90° bend, which diverts flow at the toe of slope. Debris noted along entire channel length.

8) Reservoir Drain/Outlet

Type: Pipe UnKnown Conduit _____ Other UNKNOWN

Material: Concrete _____ Metal _____ Other UNKNOWN

Size: UNKNOWN Length UNKNOWN

Invert Elevations: Entrance UNKNOWN Exit _____

Physical Condition (Describe): Unobservable _____

Material: UNKNOWN

Joints: _____ Alignment _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate _____ Valve ✓ Uncontrolled _____

Operation: Operable _____ Inoperable ✓ Other _____

Present Condition (Describe): _____

b) Structural

a. Concrete Surfaces Not Applicable (NA) —

b. Structural Cracking N.A. —

c. Movement - Horizontal & Vertical Alignment (Settlement) N.A. —

d. Junctions with Abutments or Embankments N.A. —

e. Drains - Foundation, Joint, Face N.A. —

f. Water Passages, Conduits, Sluices N.A. —

g. Seepage or Leakage N.A. —

h. Joints - Construction, etc. N.A.

i. Foundation N.A.

j. Abutments N.A.

k. Control Gates N.A.

l. Approach & Outlet Channels N.A.

m. Energy Dissipators (Plunge Pool, etc.) N.A.

n. Intake Structures N.A.

o. Stability N.A.

p. Miscellaneous N.A.

APPENDIX D

HYDROLOGIC DATA AND COMPUTATIONS

TAMS

Job No. 1551-02 Sheet 1 of 4

Project PHASE 1 DAM SAFETY INSPECTION Date MAY 2 1980

Subject TRANSPOSITION OF U/G to MORGAN LAKE BASIN By DLC

USING U/G from Subarea in WAPPINGERS FALLS BASIN (REF 2) Ch'k. by

TIME (HRS)	Q (CFS)	Runoff (Q×½) cfs/days	Dimensionless U/G abscissa (T/Tp)	Dimensionless U/G ordinate (Q/Qp)	Transposed U/G Time (T)(.01)	Transposed U/G Q (q)(Qp)
			x axis	Y axis		
0	0	0	0	0	0	0
3	220	30	67.6	4.749	.7	95
6	456	57	135.	9.022	1.4	180.
9	402	50.3	203.	7.954	2.0	159.
12	259	32.4	270.	5.125	2.7	103.
15	162	20.3	338.	3.205	3.4	64.1
18	103	12.9	405.	2.038	4.1	40.8
21	65	6.1	473.	1.286	4.7	25.7
24	42	5.3	540.	0.821	5.4	16.6
27	26	3.3	608.	0.514	6.1	10.3
30	17	2.1	676.	.336	6.8	6.7
33	11	1.4	743.	0.218	7.4	4.4
36	7	0.9	811.	0.131	8.1	2.6
39	4	0.5	878.	0.079	8.8	1.6
		Σ 224.4 cfs/days				

$\frac{100}{T_p} = \frac{100}{4.44} = 22.5$

$\frac{T_p}{R/D} = \frac{4.44}{224.4} = 0.02$

For Morgan Lake Basin L= 1.5 miles / 5000 ft

Assume a flow velocity = 2.2 ft/sec $\Rightarrow$ T_p = 1.00 hour

Runoff from 480 acre basin = 480 × 1/12 × 1/2 = 20 cfs/days

$\frac{R/D}{T_p} = 20.$

$T_p/100 = .01$

U/G developed by 'Water Resources Engineers Inc' [illegible]

TAMS

Job No. 1551 - 02 Sheet 2 of 4

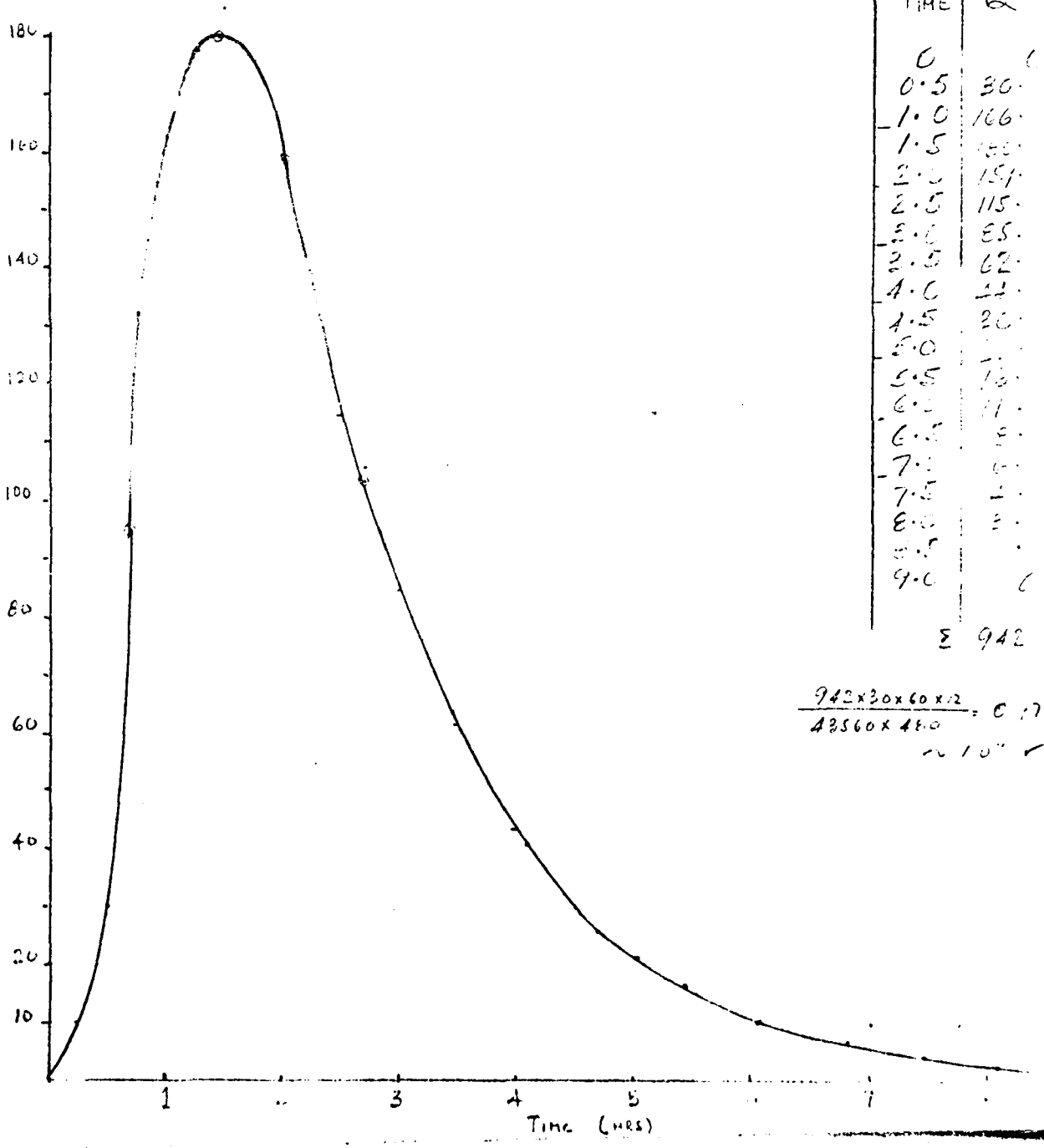
Project _____ Date MAY 2 1980

Subject MORGAN LAKE - UNIT HYDROGRAPH By J L C

UNGAGED BASINS Ch'k. by _____

$L = 1.52$ miles

$Q_p = 180$ =



TIME	Q
0	0
0.5	30
1.0	166
1.5	180
2.0	151
2.5	115
3.0	85
3.5	62
4.0	44
4.5	30
5.0	21
5.5	15
6.0	11
6.5	8
7.0	6
7.5	4
8.0	3
8.5	2
9.0	0
Σ	942

$\frac{942 \times 30 \times 60 \times 2}{43560 \times 4.0} = 0.97$

$\approx 1.0"$ ✓

TAMS

Job No. 1551-02 Sheet 3 of 4

Project MORGAN LAKE PHASE I INSPECTION Date MAY 6 1980

Subject ELEVATION - AREA - STORAGE By DLC.

Ch'k. by

CONIC METHOD GENERATION

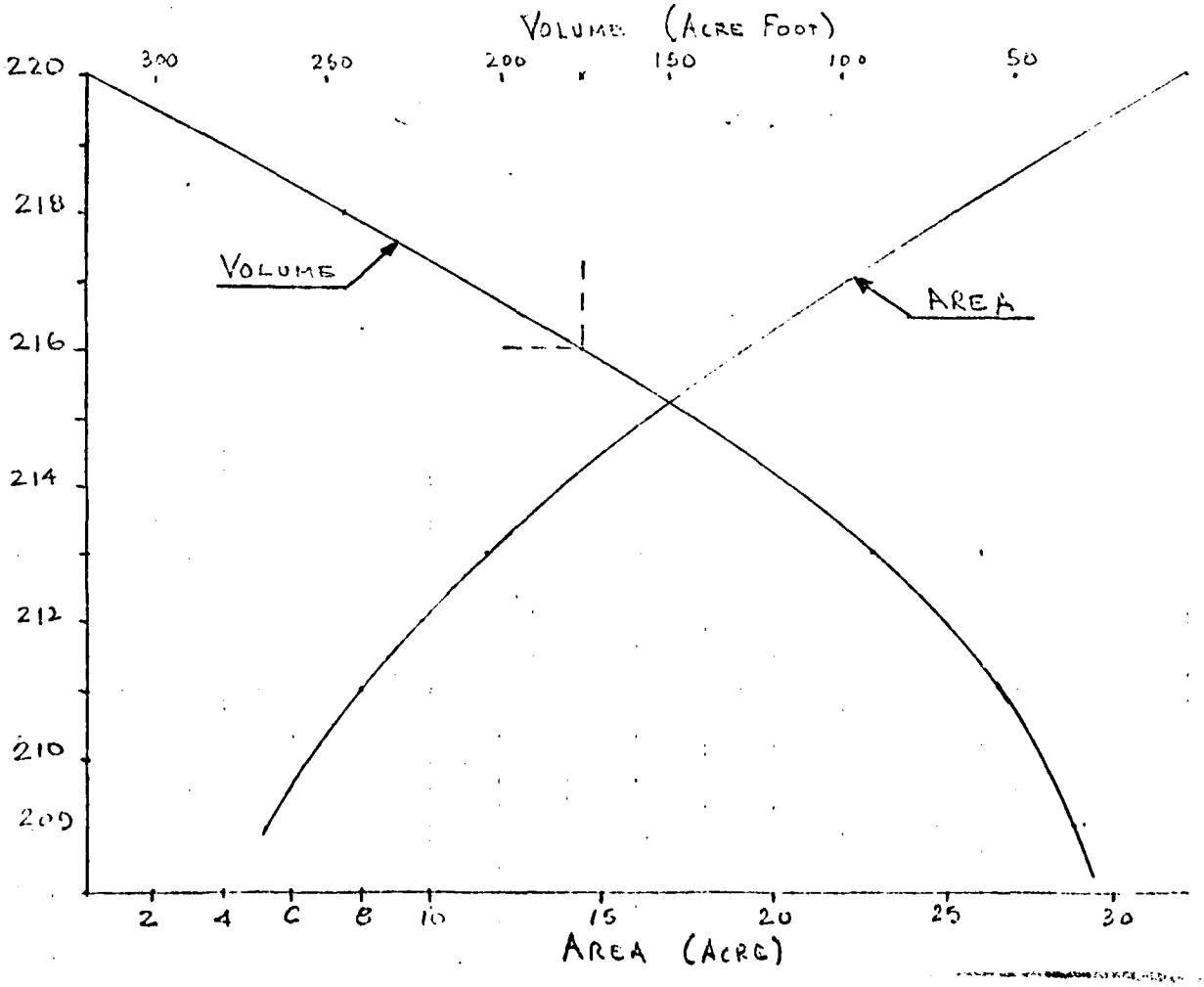
Surface Area = 11.8 Ac at EL 213.
APEX OF CONE EL 190

$A = \pi R^2$

$V = \frac{\pi}{3} R h$

ELEVATION	h	AREA (acres)	VOLUME (acre-feet)
190	0'	0	0
[1] 209	19'	5.8	33
[2] 211	21'	8.0	56
[1] 213	23'	11.8	90.5
[1] 220	30'	32.0	320

(1) Area planimetered from USGS QUAD SHEET
(2) Area extrapolated



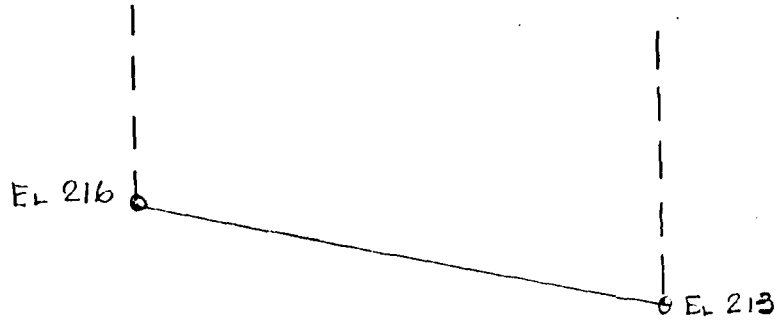
TAMS

Job No. 1551-02 Sheet 4 of 4

Project MORGAN LAKE PHASE 1 INSPECTION Date JUNE 2 1980

Subject OUT FLOW (1) EXISTING By DLC

(2) PROPOSED with 2 - 30" ϕ RCP Ch'k. by



H' ~ equivalent

30" Pipe
A = 4.91 ft²

EL	L	A	½ H'	$Q_s = 2.78 H'^{3/2} L$	Q_p At E 209	$A\sqrt{\frac{2gH}{1+k_p+\frac{29n^2}{R^{4/3}}L}}$ At EL 211
213	0	0			35	20
216	277	415.5	1.5	1413	54.5	42.3
218	277	969.5	3.5	5039	64.6	54.5

EL	STORAGE	DISCHARGE (1)	(2)
190	0	0	0
209	33.0	0	0
211	56.0	0	0
213	90.5	0	35
216	177.	1455	1510
218	245	5094	5159

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE= 80/06/02.
     TIME= 15.19.16.


                    PHASE 1 INSPECTION AND SAFETY EVALUATION OF MORGAN LAKE DAM     1551-02
                            SPILLWAY ADEQUACY ANALYSIS USING RATIOS      MAY 1980
                            OF THE PROBABLE MAXIMUM FLOOD - TAMS ENGINEERS & ARCHITECTS

                                                JOB SPECIFICATION
                      NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
                     100        0       30        0        0        0        0        0        0        0
                                                JOPER      NWT    LROPT    TRACE
                                                    5        0        0        0


                                          MULTI-PLAN ANALYSES TO BE PERFORMED
                                                NPLAN= 1 NRTIO= 4 LRTIO= 1
                                RTIOS=   1.00     .75     .50     .25

**********      **********      **********      **********      **********
                                          SUB-AREA RUNOFF COMPUTATION

                                INFLOW HYDROGRAPH COMPUTATION FOR MORGAN LAKE

                                     ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                         1       0       0       0       0       0       0       0       0

                                                HYDROGRAPH DATA
                              IHYDG   IUHG    TAREA    SNAP    TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                                  1      -1      .75    0.00      .75    0.00   0.000       0       1       0

                                                PRECIP DATA
                                     SPFE     PMS      R6     R12     R24     R48     R72     R96
                                     0.00   24.00   95.83  108.30  116.67    0.00    0.00    0.00
                TRSPC COMPUTED BY THE PROGRAM IS  .800

                                                LOSS DATA
                          LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                              0    0.00    0.00    1.00    0.00    0.00    1.00    2.00     .05    0.00     .16

                                                GIVEN UNIT GRAPH, NUMGQ= 18
                             30.     166.     180.     159.     115.      85.      62.      44.      30.      22.
                             16.      11.       8.       6.       4.       3.       1.       0.
                                UNIT GRAPH TOTALS    942. CFS OR  .97 INCHES OVER THE AREA

                                                RECESSION DATA
                                          STRTQ=   -1.00    QRCSN=    -.05    RTIOR= 3.00

                                                END-OF-PERIOD FLOW
                    0
                  MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q        MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                   1.01    .30       1    .05    .01    .04        1.        1.02   1.30      51   0.00   0.00   0.00       64.
                   1.01   1.00       2    .05    .01    .04        2.        1.02   2.00      52   0.00   0.00   0.00       57.
```

LOSS DATA

[illegible]	STRKR	DLTKR	RTIO	ERAIN	STRKS	RTIOK	[illegible]L	[illegible]	A[illegible]	RT[illegible]
)		C	1.	0.0	0.00	.00	[illegible]	[illegible]	[illegible]	[illegible]

GIVEN UNIT GRAPH, NUMGO= 18

30.	166.	180.	159.	115.	85.	62.	44.	30.	22.
16.	11.	8.	6.	4.	3.	1.	0.		

UNIT GRAPH TOTALS 942. CFS OR .97 INCHES OVER THE AREA

RECESSION DATA

STRTQ= -1.00 QRCSN= -.05 RTIOR= 3.00

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.30	1	.05	.01	.04	1.	1.02	1.30	51	0.00	0.00	0.00	64.
1.01	1.00	2	.05	.01	.04	2.	1.02	2.00	52	0.00	0.00	0.00	57.
1.01	1.30	3	.05	.01	.04	4.	1.02	2.30	53	0.00	0.00	0.00	51.
1.01	2.00	4	.05	.01	.04	5.	1.02	3.00	54	0.00	0.00	0.00	46.
1.01	2.30	5	.05	.01	.04	6.	1.02	3.30	55	0.00	0.00	0.00	41.
1.01	3.00	6	.05	.01	.04	7.	1.02	4.00	56	0.00	0.00	0.00	37.
1.01	3.30	7	.05	.01	.04	7.	1.02	4.30	57	0.00	0.00	0.00	33.
1.01	4.00	8	.05	.01	.04	8.	1.02	5.00	58	0.00	0.00	0.00	30.
1.01	4.30	9	.05	.01	.04	8.	1.02	5.30	59	0.00	0.00	0.00	27.
1.01	5.00	10	.05	.01	.04	8.	1.02	6.00	60	0.00	0.00	0.00	24.
1.01	5.30	11	.05	.01	.04	8.	1.02	6.30	61	0.00	0.00	0.00	21.
1.01	6.00	12	.05	.01	.04	8.	1.02	7.00	62	0.00	0.00	0.00	19.
1.01	6.30	13	.20	.03	.17	9.	1.02	7.30	63	0.00	0.00	0.00	17.
1.01	7.00	14	.20	.03	.17	13.	1.02	8.00	64	0.00	0.00	0.00	15.
1.01	7.30	15	.20	.03	.17	17.	1.02	8.30	65	0.00	0.00	0.00	14.
1.01	8.00	16	.20	.03	.17	21.	1.02	9.00	66	0.00	0.00	0.00	12.
1.01	8.30	17	.20	.03	.17	23.	1.02	9.30	67	0.00	0.00	0.00	11.
1.01	9.00	18	.20	.03	.17	25.	1.02	10.00	68	0.00	0.00	0.00	10.
1.01	9.30	19	.20	.06	.14	28.	1.02	10.30	69	0.00	0.00	0.00	9.
1.01	10.00	20	.20	.18	.02	37.	1.02	11.00	70	0.00	0.00	0.00	8.
1.01	10.30	21	.20	.18	.02	62.	1.02	11.30	71	0.00	0.00	0.00	7.
1.01	11.00	22	.20	.18	.02	89.	1.02	12.00	72	0.00	0.00	0.00	6.
1.01	11.30	23	.20	.18	.02	111.	1.02	12.30	73	0.00	0.00	0.00	6.
1.01	12.00	24	.20	.18	.02	127.	1.02	13.00	74	0.00	0.00	0.00	5.
1.01	12.30	25	.92	.90	.02	161.	1.02	13.30	75	0.00	0.00	0.00	5.
1.01	13.00	26	.92	.90	.02	289.	1.02	14.00	76	0.00	0.00	0.00	4.
1.01	13.30	27	1.10	1.08	.02	431.	1.02	14.30	77	0.00	0.00	0.00	4.
1.01	14.00	28	1.10	1.08	.02	580.	1.02	15.00	78	0.00	0.00	0.00	3.
1.01	14.30	29	1.38	1.36	.02	707.	1.02	15.30	79	0.00	0.00	0.00	3.
1.01	15.00	30	1.38	1.36	.02	846.	1.02	16.00	80	0.00	0.00	0.00	3.
1.01	15.30	31	1.68	1.66	.02	972.	1.02	16.30	81	0.00	0.00	0.00	2.
1.01	16.00	32	5.31	5.29	.02	1223.	1.02	17.00	82	0.00	0.00	0.00	2.
1.01	16.30	33	1.29	1.27	.02	1825.	1.02	17.30	83	0.00	0.00	0.00	2.
1.01	17.00	34	1.29	1.27	.02	1906.	1.02	18.00	84	0.00	0.00	0.00	2.
1.01	17.30	35	1.01	.99	.02	1820.	1.02	18.30	85	0.00	0.00	0.00	2.
1.01	18.00	36	1.01	.99	.02	1602.	1.02	19.00	86	0.00	0.00	0.00	1.
1.01	18.30	37	.08	.06	.02	1406.	1.02	19.30	87	0.00	0.00	0.00	1.
1.01	19.00	38	.08	.06	.02	1116.	1.02	20.00	88	0.00	0.00	0.00	1.
1.01	19.30	39	.08	.06	.02	845.	1.02	20.30	89	0.00	0.00	0.00	1.
1.01	20.00	40	.08	.06	.02	618.	1.02	21.00	90	0.00	0.00	0.00	1.
1.01	20.30	41	.08	.06	.02	461.	1.02	21.30	91	0.00	0.00	0.00	1.
1.01	21.00	42	.08	.06	.02	345.	1.02	22.00	92	0.00	0.00	0.00	1.
1.01	21.30	43	.08	.06	.02	258.	1.02	22.30	93	0.00	0.00	0.00	1.
1.01	22.00	44.	.08	.06	.02	199.	1.02	23.00	94	0.00	0.00	0.00	1.
1.01	22.30	45	.08	.06	.02	157.	1.02	23.30	95	0.00	0.00	0.00	1.
1.01	23.00	46	.08	.06	.02	125.	1.03	0.00	96	0.00	0.00	0.00	0.
1.01	23.30	47	.08	.06	.02	103.	1.03	.30	97	0.00	0.00	0.00	0.
1.02	0.00	48	.08	.06	.02	89.	1.03	1.00	98	0.00	0.00	0.00	0.
1.02	.30	49	0.00	0.00	0.00	80.	1.03	1.30	99	0.00	0.00	0.00	0.
1.02	1.00	50	0.00	0.00	0.00	72.	1.03	2.00	100	0.00	0.00	0.00	0.
									SUM	22.40	20.11	2.29	19482.
										(569.)	(511.)	(58.)	(551.67)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1906.	1239.	401.	195.	19480.
CMS	54.	35.	11.	6.	552.
INCHES		15.36	19.87	20.13	20.13
MM		390.25	504.73	511.41	511.41
AC-FT		614.	794.	805.	805.
THOUS CU M		758.	980.	993.	993.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

1.	2.	4.	5.	6.	7.	7.	8.	8.	8.
8.	8.	9.	13.	17.	21.	23.	25.	28.	37.
62.	89.	111.	127.	161.	289.	431.	580.	707.	846.

SUM 22.40 20.11 2.29 19482.
(569.) (51) (58.) 551.67

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1906.	1239.	401.	195.	19480.
CMS	54.	35.	11.	6.	552.
INCHES		15.36	19.87	20.13	20.13
MM		390.25	504.73	511.41	511.41
AC-FT		614.	794.	805.	805.
THOUS CU M		758.	980.	993.	993.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

1.	2.	4.	5.	6.	7.	7.	8.	8.	8.
8.	8.	9.	13.	17.	21.	23.	25.	28.	37.
62.	89.	111.	127.	161.	289.	431.	580.	707.	846.
972.	1223.	1825.	1906.	1820.	1602.	1406.	1116.	845.	618.
461.	345.	258.	199.	157.	125.	103.	89.	80.	72.
64.	57.	51.	46.	41.	37.	33.	30.	27.	24.
21.	19.	17.	15.	14.	12.	11.	10.	9.	8.
7.	6.	6.	5.	5.	4.	4.	3.	3.	3.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1906.	1239.	401.	195.	19480.
CMS	54.	35.	11.	6.	552.
INCHES		15.36	19.87	20.13	20.13
MM		390.25	504.73	511.41	511.41
AC-FT		614.	794.	805.	805.
THOUS CU M		758.	980.	993.	993.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

1.	2.	3.	4.	5.	5.	5.	6.	6.	6.
6.	6.	7.	10.	13.	16.	18.	19.	21.	28.
47.	67.	83.	96.	121.	217.	323.	435.	530.	634.
729.	917.	1368.	1430.	1365.	1201.	1054.	837.	633.	463.
346.	259.	194.	149.	118.	94.	77.	67.	60.	54.
48.	43.	39.	35.	31.	28.	25.	22.	20.	18.
16.	14.	13.	12.	10.	9.	8.	7.	7.	6.
5.	5.	4.	4.	3.	3.	3.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1430.	929.	300.	146.	14610.
CMS	40.	26.	9.	4.	414.
INCHES		11.52	14.90	15.10	15.10
MM		292.69	378.54	383.55	383.55
AC-FT		461.	596.	604.	604.
THOUS CU M		568.	735.	745.	745.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

0.	1.	2.	3.	3.	3.	4.	4.	4.	4.
4.	4.	4.	6.	8.	10.	12.	13.	14.	19.
31.	44.	56.	64.	80.	145.	215.	290.	354.	423.
486.	611.	912.	953.	910.	801.	703.	558.	422.	309.
231.	172.	129.	99.	79.	63.	51.	45.	40.	36.
32.	29.	26.	23.	21.	19.	17.	15.	13.	12.
11.	10.	9.	8.	7.	6.	6.	5.	4.	4.
4.	3.	3.	3.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	953.	619.	200.	97.	9740.
CMS	27.	18.	6.	3.	276.
INCHES		7.68	9.94	10.07	10.07
MM		195.13	252.36	255.70	255.70
AC-FT		307.	397.	402.	402.
THOUS CU M		379.	490.	496.	496.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	1.	1.	1.	2.	2.	2.	2.	2.	2.
2.	2.	2.	3.	4.	5.	6.	6.	7.	9.
16.	22.	28.	37.	40.	72.	108.	145.	177.	211.

1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	[illegible]

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	953.	619.	200.	97.	9740.
CMS	27.	18.	6.	3.	276.
INCHES		7.68	9.94	10.07	10.07
MM		195.13	252.36	255.70	255.70
AC-FT		307.	397.	402.	402.
THOUS CU M		379.	490.	496.	496.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

0.	1.	1.	1.	2.	2.	2.	2.	2.	2.
2.	2.	2.	3.	4.	5.	6.	6.	7.	9.
16.	22.	28.	32.	48.	72.	108.	145.	177.	211.
243.	306.	456.	477.	455.	400.	351.	279.	211.	154.
115.	86.	65.	50.	39.	31.	26.	22.	20.	18.
16.	14.	13.	12.	10.	9.	8.	7.	7.	6.
5.	5.	4.	4.	3.	3.	3.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	477.	310.	100.	49.	4870.
CMS	13.	9.	3.	1.	138.
INCHES		3.84	4.97	5.03	5.03
MM		97.56	126.18	127.85	127.85
AC-FT		154.	199.	201.	201.
THOUS CU M		189.	245.	248.	248.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTED FLOWS THROUGH MORGAN LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	33.	-1

STAGE	190.00	209.00	211.00	213.00	216.00	218.00
FLOW	0.00	0.00	20.00	35.00	1510.00	5159.00
CAPACITY=	0.	33.	56.	91.	177.	245.
ELEVATION=	190.	209.	211.	213.	216.	218.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
209.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
213.0	0.0	1.5	277.

STATION 2, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	1.	1.	1.	1.	1.	2.
2.	2.	2.	3.	3.	4.	4.	5.	6.	7.
8.	11.	14.	17.	21.	25.	30.	147.	407.	600.
762.	937.	1244.	1629.	1875.	1702.	1504.	1377.	1169.	940.
730.	559.	424.	322.	246.	191.	151.	122.	102.	88.
78.	69.	61.	55.	49.	44.	39.	35.	35.	35.
35.	34.	34.	34.	33.	33.	33.	32.	32.	31.
31.	31.	30.	30.	29.	29.	28.	28.	28.	27.
27.	26.	26.	25.	25.	25.	24.	24.	23.	23.
23.	22.	22.	21.	21.	21.	20.	20.	19.	19.

STATION [illegible] PLAN [illegible] RATIO [illegible]

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	1.	1.	1.	1.	1.	2.
2.	2.	2.	3.	3.	4.	4.	5.	6.	7.
8.	11.	14.	17.	21.	25.	30.	147.	407.	600.
762.	937.	1244.	1629.	1875.	1702.	1504.	1377.	1169.	940.
730.	559.	424.	322.	246.	191.	151.	122.	102.	88.
78.	69.	61.	55.	49.	44.	39.	35.	35.	35.
35.	34.	34.	34.	33.	33.	33.	32.	32.	31.
31.	31.	30.	30.	29.	29.	28.	28.	28.	27.
27.	26.	26.	25.	25.	25.	24.	24.	23.	23.
23.	22.	22.	21.	21.	21.	20.	20.	19.	19.

STORAGE

33.	33.	33.	33.	34.	34.	34.	34.	35.	35.
35.	35.	36.	36.	36.	37.	38.	39.	40.	41.
42.	45.	49.	53.	58.	67.	80.	98.	113.	124.
133.	144.	161.	179.	184.	181.	177.	169.	157.	144.
132.	122.	114.	108.	103.	100.	98.	96.	95.	94.
93.	93.	93.	92.	92.	92.	91.	91.	91.	90.
90.	89.	89.	88.	87.	86.	85.	85.	84.	83.
82.	81.	80.	79.	78.	77.	76.	75.	74.	73.
72.	71.	70.	69.	68.	67.	66.	65.	64.	63.
62.	61.	60.	59.	58.	58.	57.	56.	55.	54.

STAGE

209.0	209.0	209.0	209.0	209.1	209.1	209.1	209.1	209.1	209.2
209.2	209.2	209.2	209.3	209.3	209.4	209.4	209.5	209.6	209.7
209.8	210.1	210.4	210.7	211.1	211.6	212.4	213.2	213.8	214.1
214.5	214.8	215.5	216.1	216.2	216.1	216.0	215.7	215.3	214.8
214.4	214.1	213.8	213.6	213.4	213.3	213.2	213.2	213.1	213.1
213.1	213.1	213.1	213.0	213.0	213.0	213.0	213.0	213.0	213.0
212.9	212.9	212.9	212.8	212.8	212.7	212.7	212.6	212.6	212.5
212.5	212.4	212.4	212.3	212.2	212.2	212.1	212.1	212.0	211.9
211.9	211.8	211.8	211.7	211.7	211.6	211.6	211.5	211.4	211.4
211.3	211.3	211.2	211.2	211.1	211.1	211.0	211.0	210.9	210.9

PEAK OUTFLOW IS 1875. AT TIME 17.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1875.	1204.	379.	190.	18967.
CMS	53.	34.	11.	5.	537.
INCHES		14.93	18.82	19.60	19.60
MM		379.33	478.12	497.95	497.95
AC-FT		597.	753.	784.	784.
THOUS CU M		736.	928.	967.	967.

STATION 2, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	2.	2.	2.	2.	3.	3.	4.	4.	5.
6.	8.	10.	13.	16.	21.	25.	31.	166.	384.
540.	688.	926.	1173.	1291.	1287.	1204.	1069.	894.	713.
552.	421.	319.	242.	185.	144.	113.	92.	77.	66.
58.	52.	46.	41.	37.	35.	35.	35.	34.	34.
34.	33.	33.	33.	32.	32.	32.	31.	31.	30.
30.	29.	29.	29.	28.	28.	27.	27.	26.	26.
26.	25.	25.	24.	24.	23.	23.	23.	22.	22.
22.	21.	21.	20.	20.	20.	19.	18.	18.	17.

STORAGE

33.	33.	33.	33.	33.	34.	34.	34.	34.	34.
35.	35.	35.	35.	36.	36.	37.	37.	38.	39.
40.	42.	45.	48.	52.	58.	68.	83.	99.	111.
120.	129.	143.	157.	164.	164.	159.	151.	141.	131.
121.	114.	108.	103.	100.	97.	96.	94.	93.	93.
92.	92.	92.	91.	91.	91.	91.	90.	90.	89.
88.	87.	87.	86.	85.	84.	83.	82.	81.	80.
79.	78.	77.	76.	75.	74.	73.	72.	71.	70.
69.	68.	67.	66.	65.	64.	63.	62.	61.	61.
60.	59.	58.	57.	56.	55.	55.	54.	53.	53.

STAGE

30.	33.	33.	33.	32.	32.	32.	31.	31.	30.
30.	29.	29.	29.	28.	28.	27.	27.	26.	26.
2						1.	23.	22.	22.
22.	21.	21.	20.	20.	20.	19.	18.	18.	17.

STORAGE

33.	33.	33.	33.	33.	34.	34.	34.	34.	34.
35.	35.	35.	35.	36.	36.	37.	37.	38.	39.
40.	42.	45.	48.	52.	58.	68.	83.	99.	111.
126.	129.	143.	157.	164.	164.	159.	151.	141.	131.
121.	114.	108.	103.	100.	97.	96.	94.	93.	93.
92.	92.	92.	91.	91.	91.	91.	90.	90.	89.
88.	87.	87.	86.	85.	84.	83.	82.	81.	80.
79.	78.	77.	76.	75.	74.	73.	72.	71.	70.
69.	68.	67.	66.	65.	64.	63.	62.	61.	61.
60.	59.	58.	57.	56.	55.	55.	54.	53.	53.

STAGE

209.0	209.0	209.0	209.0	209.0	209.1	209.1	209.1	209.1	209.1
209.1	209.2	209.2	209.2	209.2	209.3	209.3	209.4	209.4	209.5
209.6	209.8	210.0	210.3	210.6	211.1	211.7	212.5	213.3	213.7
214.0	214.3	214.8	215.3	215.6	215.5	215.4	215.1	214.7	214.4
214.1	213.8	213.6	213.4	213.3	213.2	213.2	213.1	213.1	213.1
213.0	213.0	213.0	213.0	213.0	213.0	213.0	212.9	212.9	212.9
212.8	212.8	212.7	212.7	212.6	212.6	212.5	212.5	212.4	212.4
212.3	212.3	212.2	212.1	212.1	212.0	212.0	211.9	211.9	211.8
211.7	211.7	211.6	211.6	211.5	211.5	211.4	211.4	211.3	211.3
211.2	211.2	211.1	211.1	211.0	211.0	210.9	210.8	210.8	210.7

PEAK OUTFLOW IS 1291. AT TIME 17.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1291.	895.	280.	141.	14140.
CMS	37.	25.	8.	4.	400.
INCHES		11.10	13.90	14.62	14.62
MM		281.93	353.05	371.23	371.23
AC-FT		444.	556.	584.	584.
THOUS CU M		547.	685.	721.	721.

STATION 2, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	3.	3.
4.	5.	7.	9.	11.	15.	20.	24.	29.	58.
266.	414.	596.	772.	856.	855.	801.	712.	596.	475.
368.	281.	213.	161.	123.	96.	75.	61.	51.	44.
39.	35.	35.	35.	34.	34.	34.	34.	33.	33.
33.	32.	32.	31.	31.	30.	30.	30.	29.	29.
28.	28.	27.	27.	27.	26.	26.	25.	25.	24.
24.	24.	23.	23.	22.	22.	22.	21.	21.	21.
20.	20.	19.	18.	18.	17.	17.	16.	15.	15.

STORAGE

33.	33.	33.	33.	33.	33.	34.	34.	34.	34.
34.	34.	34.	34.	35.	35.	35.	36.	36.	37.
38.	39.	41.	43.	46.	50.	56.	66.	78.	92.
104.	113.	124.	134.	139.	139.	136.	130.	124.	117.
110.	105.	101.	98.	96.	95.	93.	93.	92.	92.
91.	91.	91.	90.	90.	89.	88.	88.	87.	86.
85.	84.	83.	82.	81.	80.	79.	78.	77.	76.
75.	74.	73.	72.	71.	70.	69.	68.	67.	66.
65.	64.	64.	63.	62.	61.	60.	59.	58.	57.
57.	56.	55.	54.	54.	53.	52.	51.	51.	50.

STAGE

209.0	209.0	209.0	209.0	209.0	209.0	209.0	209.1	209.1	209.1
209.1	209.1	209.1	209.1	209.2	209.2	209.2	209.2	209.3	209.3
209.4	209.5	209.7	209.9	210.1	210.5	211.0	211.6	212.3	213.0
213.5	213.8	214.1	214.5	214.7	214.7	214.6	214.4	214.1	213.9
213.7	213.5	213.4	213.3	213.2	213.1	213.1	213.1	213.0	213.0
213.0	213.0	213.0	213.0	212.9	212.9	212.9	212.8	212.8	212.7
212.7	212.6	212.6	212.5	212.5	212.4	212.3	212.3	212.2	212.2
212.1	212.0	212.0	211.9	211.9	211.8	211.8	211.7	211.6	211.6
211.5	211.5	211.4	211.4	211.3	211.3	211.2	211.2	211.1	211.1
211.0	211.0	210.9	210.8	210.8	210.7	210.7	210.6	210.5	210.5

PEAK OUTFLOW IS 856. AT TIME 17.50 HOURS

65.	64.	64.	63.	62.	61.	60.	59.	58.	57.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53.	52.	51.	51.	50

STAGE

209.0	209.0	209.0	209.0	209.0	209.0	209.0	209.1	209.1	209.1
209.1	209.1	209.1	209.1	209.2	209.2	209.2	209.2	209.3	209.3
209.4	209.5	209.7	209.9	210.1	210.5	211.0	211.6	212.3	213.0
213.5	213.8	214.1	214.5	214.7	214.7	214.6	214.4	214.1	213.9
213.7	213.5	213.4	213.3	213.2	213.1	213.1	213.1	213.0	213.0
213.0	213.0	213.0	213.0	212.9	212.9	212.9	212.8	212.8	212.7
212.7	212.6	212.6	212.5	212.5	212.4	212.3	212.3	212.2	212.2
212.1	212.0	212.0	211.9	211.9	211.8	211.8	211.7	211.6	211.6
211.5	211.5	211.4	211.4	211.3	211.3	211.2	211.2	211.1	211.1
211.0	211.0	210.9	210.8	210.8	210.7	210.7	210.6	210.5	210.5

PEAK OUTFLOW IS 856. AT TIME 17.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	856.	580.	182.	93.	9328.
CMS	24.	16.	5.	3.	264.
INCHES		7.20	9.01	9.64	9.64
MM		182.85	228.90	244.89	244.89
AC-FT		288.	360.	385.	385.
THOUS CU M		355.	444.	475.	475.

STATION 2, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	1.	1.	2.
2.	3.	3.	4.	5.	7.	10.	14.	19.	23.
26.	31.	91.	287.	381.	405.	390.	351.	295.	237.
183.	140.	106.	81.	62.	48.	38.	35.	35.	34.
34.	34.	33.	33.	33.	32.	32.	31.	31.	31.
30.	30.	29.	29.	28.	28.	27.	27.	27.	26.
26.	25.	25.	24.	24.	24.	23.	23.	22.	22.
22.	21.	21.	21.	20.	20.	19.	19.	18.	17.
17.	16.	16.	15.	14.	14.	13.	13.	13.	12.

STORAGE

33.	33.	33.	33.	33.	33.	33.	33.	33.	33.
34.	34.	34.	34.	34.	34.	34.	34.	35.	35.
35.	36.	37.	38.	39.	41.	45.	49.	55.	63.
71.	81.	94.	106.	111.	113.	112.	109.	106.	103.
100.	97.	95.	94.	93.	92.	91.	91.	90.	90.
89.	88.	87.	86.	85.	85.	84.	83.	82.	81.
80.	79.	78.	76.	75.	74.	73.	72.	71.	70.
69.	68.	67.	66.	65.	65.	64.	63.	62.	61.
60.	59.	58.	57.	57.	56.	55.	54.	54.	53.
52.	51.	51.	50.	50.	49.	48.	48.	47.	47.

STAGE

209.0	209.0	209.0	209.0	209.0	209.0	209.0	209.0	209.0	209.0
209.0	209.1	209.1	209.1	209.1	209.1	209.1	209.1	209.1	209.2
209.2	209.3	209.3	209.4	209.5	209.7	210.0	210.4	210.9	211.4
211.9	212.4	213.1	213.5	213.7	213.8	213.7	213.6	213.5	213.4
213.3	213.2	213.1	213.1	213.1	213.0	213.0	213.0	213.0	212.9
212.9	212.8	212.8	212.7	212.7	212.6	212.6	212.5	212.5	212.4
212.3	212.3	212.2	212.2	212.1	212.1	212.0	211.9	211.9	211.8
211.8	211.7	211.7	211.6	211.5	211.5	211.4	211.4	211.3	211.3
211.2	211.2	211.1	211.1	211.0	211.0	210.9	210.9	210.8	210.7
210.7	210.6	210.6	210.5	210.4	210.4	210.3	210.3	210.3	210.2

PEAK OUTFLOW IS 405. AT TIME 18.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	405.	244.	84.	45.	4537.
CMS	11.	7.	2.	1.	128.
INCHES		3.03	4.19	4.69	4.69
MM		77.00	106.47	119.11	119.11
AC-FT		121.	168.	187.	187.
THOUS CU M		150.	207.	231.	231.

211.2 211.0 211.1 211.1 211.0 211.0 210.9 210.9 210.9 210.8
210.7 210.6 210.6 210.5 210.4 210.4 210.3 210.3 210.3 210.2

PEAK OUTFLOW IS 405. AT TIME 18.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	405.	244.	84.	45.	4537.
CMS	11.	7.	2.	1.	128.
INCHES		3.03	4.19	4.69	4.69
MM		77.00	106.47	119.11	119.11
AC-FT		121.	168.	187.	187.
THOUS CU M		150.	207.	231.	231.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .75	RATIO 3 .50	RATIO 4 .25
HYDROGRAPH AT	1	.75	1	1906.	1430.	953.	477.
		(1.94)		(53.97)(	40.48)(	26.99)(	13.49)(
ROUTED TO	2	.75	1	1875.	1291.	856.	405.
		(1.94)		(53.10)(	36.55)(	24.23)(	11.48)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	209.00	209.00	213.00
STORAGE	33.	33.	91.
OUTFLOW	0.	0.	35.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	216.20	3.20	184.	1875.	15.50	17.50	0.00
.75	215.55	2.55	164.	1291.	13.50	17.50	0.00
.50	214.67	1.67	139.	856.	11.00	17.50	0.00
.25	213.75	.75	113.	405.	7.50	18.00	0.00

APPENDIX E

OTHER DATA

December 29, 1978

Mr. Stoyell Robbins
City Engineer
City of Poughkeepsie
No. 1 Mt. Carmel Place
Poughkeepsie, NY 12601

RE: Morgan Lake Dam
#685 Lower Hudson River Basin

Dear Mr. Stoyell:

Reference is made to your letter of November 30, 1978 concerning your proposed remedial work for Morgan Lake Dam.

My comments are as follows:

1. In regard to your proposal to raise the crest of the dam to a uniform elevation of 94.0, we concur, and feel that this work should receive priority. The minimum width should be eight feet instead of the four feet you propose. You may have difficulty getting eight feet of width at the low crest area (El 92.97) by the road. This should be the only area where the 4 foot width will be installed.

2. With regard to your proposal to lower the level of the lake approximately 2 feet to elevation 89.0, we have the following comments:

   a) Lowering the lake depends upon your Department being able to repair and successfully operate the 12" drain. Your letter of November 30, 1978 indicated that this work has yet to be performed.

   b) Maintaining the lower lake level at elevation 89.0 by opening and closing the 12 inch gate valve will require constant surveillance by personnel from the Water Department. A more reliable and less time-consuming operating would depend upon establishing an ungated crest elevation at 89.0.

We agree with your proposal to provide additional flood storage at the site by lowering the lake level two feet. However, in order to accomplish this, alternative methods should be investigated. Consideration should be given to lowering the invert of the 30" PCP from El. 91.1 to El. 89.0. This proposal will also increase the capacity of the 30" PCP during high flow conditions.

Raising the crest of the dam and lowering the water surface of the lake will reduce the chances of overtopping of the dam; however, with your proposals, you still have a pipe spillway that will accumulate a great deal of debris at its inlet during high water periods, thus reducing its discharge capacity.

As I mentioned in my letter of October 26, 1978, the spillway outlet channel, located along the toe of slope of the dam, will have to be revised. The channel should be either realigned or armored with stone riprap.

Before you start any work on Morgan Lake Dam, a permit for the reconstruction of the dam will be required. Applications may be obtained at the Regional Office.

Mr. George Danskin
NYS Dept. of Environmental Conservation
21 South Putt Corners Rd.
New Paltz, NY 12561

Yours truly,

George Keeler, Supervisor
Dam Safety Section

WATER DEPARTMENT

THE CITY OF POUGHKEEPSIE

NEW YORK

CITY ENGINEER

1 MT. CARMEL PL.
POUGHKEEPSIE, N.Y. 12602

November 30, 1978

N.Y.S. Dept. of Environmental Conservation
Dam Safety Section
50 Wolf Road
Albany, New York 12233

ATTENTION: George Koch, Supervisor

RE: Morgan Lake Dam #685 Lower Hudson River Basin

Dear Mr. Koch:

I have reviewed your letter of October 26, 1978 describing your evaluation of problem following our mutual inspection of the dam on October 20, 1978. The following work has been accomplished to date.

1) The top and face of the dam has been surveyed using an arbitrary elevation. The water surface and the invert elevation of the existing spillway are 91.1 ft. corresponding to approximately 211 ft. shown on U.S. C & G S maps. The low point of the crest of the dam is approximately 93 ft. Most of crest, covered by an asphalt roadway, is 94.0 ft. or higher. The remainder varies between 93.0 and 95.0 ft. A copy of the map is attached.

2) The existing spillway capacity has been evaluated. Contrary to the previous information given you, the existing pipe is 30" RCP with a slope of 7.35%. The capacity is estimated to be 110 cfs. flowing full. However, the pipe will not be full before the dam is topped with the present configuration. The actual present capability is, therefore, approximately 55 cfs.

3) Arrangements have been made with the Supt. of Public Works to remove the trees and brush from the crest and face of the dam. This work is expected to be complete within the next month.

4) Arrangements have been made to repair the 12" drain line. This requires that divers plug the end in the lake during the repair operation. To date this end has not been located. This work is expected to be done within two weeks.

4

A preliminary estimate of the capacity of the drain has been made. This is calculated to be 7 to 10 cfs. depending on the level of the lake. After the repairs are complete this will be properly evaluated.

Based on the information which you supplied during inspection and subsequently be telephone, I am proposing the following plans to insure the safety of the dam. I wish to emphasize at this point that this is my personal proposal and is not approved by the City Manager or City Council. Such approvals will be required to implement the proposal. However, to meet your request of a response by November 30, 1978, I am submitting it at this time. Concurrence by your office (or non-concurrence) will significantly affect the processing of these plans.

1) There is no feasible way to dispose of 300 cfs. below the face of the dam. Not only are the existing pipes too small, but a pipe of adequate size, considering the elevations involved, could not be placed completely below ground.

2) It is therefore proposed that the configuration of the dam be changed to contain most of a maximum flood. Based on your calculations of 59 acre-feet of run-off into a 17 acre lake, the rise in level during such a maximum storm would be 3.47 ft.

3) It is proposed to maintain the level of the lake at 89.0 ft. elevation or approximately 2 ft. below the present level, by means of the 12" drain. In addition, the 12" drain would be fully opened when a major storm is predicted or has begun. This would discharge water at a rate that the existing drain system can handle and slow the rate of rise. Only in extreme cases would the existing spillway be used.

4) The maximum water level in a maximum storm would then be 89 + 3.5 or 92.5 feet less the amount discharged during the storm by the drain line and spillway. In order to achieve an additional margin of safety, it is also proposed to build up the crest to a uniform 94.0 ft. with a width of at least four feet. The top will then be seeded with a grass which will produce a strong turf.

This proposal will have the additional advantage of reducing the existing flooding condition below the dam caused by a discharge in excess of 20cfs through the existing spillway at fairly frequent intervals.

I would appreciate your evaluation of this proposal and information as to permit requirements for any of the work.

Sincerely yours,

Stoyell M. Robbins, P.E.
City Engineer

SMR:jas

Phoned me 7 Nov 78, will send news letter Nov 30 on Plan of Return.

October 26, 1978

Mr. Stoyell Robbins
City Engineer
City of Poughkeepsie
No. 1 Mt. Carmel Place
Poughkeepsie, NY 12601

RE: Morgan Lake Dam
6685 Low Hudson
River Basin

Dear Mr. Robbins:

Reference is made to our mutual inspection of Morgan Lake Dam on October 20, 1978. Mr. Willard Riverburgh and members of your Water Department accompanied us during the inspection.

The inspection revealed the following deficiencies on the 20-foot high earth dam:

1. The single 18" diameter RCP spillway does not have sufficient capacity to safely discharge flood flow through the spillway.

2. The overtopping of the earth embankment near the road is further evidence that additional spillway capacity is required. This is the area where the riprap was placed.

3. The spillway outlet channel is located along the toe of slope of the dam embankment. Embankment erosion could occur during high flow periods.

4. The valve for the 12 inch diameter drain pipe is inoperable.

5. Our records indicate that this dam was built in 1868. The dam now suffers from a lack of maintenance. The trees and brush that have grown along the downstream slope of the dam should be removed.

As a result of the above-mentioned deficiencies, the following engineering investigations and remedial work is required.

1. The spillway capacity should be increased to prevent overtopping of the earth embankment during periods of high runoff. Preliminary investigations indicate that the spillway should have sufficient capacity to discharge 300 cfs.

Inspection of the flood plain below the dam indicates that flow from the spillway enters your storm drain system which consists of a 24 inch diameter pipe. Because the present storm drain is inadequate to discharge spillway flood flows, consideration should be given to installing a separate pipe to handle the spillway flows. This pipe would be about 1200 feet long and would discharge into Fallbill Creek.

2. Additional earth embankment is required in the area near the road where the dam has been overtopped.

3. The spillway outlet channel which is located along the toe of slope of the dam will have to be revised. The channel should be either realigned or armored with stone riprap.

4. Maintenance is required on the valve for the 12 inch drain pipe so that it will be operable.

5. On the downstream slope of the dam, the brush should be removed and the trees cut at ground level.

A review of our files indicates that your office was informed of the above-mentioned deficiencies on January 9, 1978. We would like to remind you that in the event of dam failure, the owner of the structure is responsible for all downstream damage. This dam is classified as a high hazard structure because of the location of the Smith Stone housing project located about 1000 feet below the dam. Because of the past history of overtopping, corrective work for this structure should receive priority. We therefore require that you inform this office by November 30, 1978 of your plans for corrective work on this dam. If you have any questions, please call us at (916) 457-1210.

Yours truly,

George Koch, Supervisor
Dam Safety Section

Cc: file

January 20, 1978

Mr. Willard Rivenburgh
Acting City Engineer
City of Poughkeepsie
No. 1 Mt. Carmel Place
Poughkeepsie, NY 12601

RE: Lake Morgan Dam #635,
Lower Hudson

Dear Mr. Rivenburgh:

A hydrologic investigation of the Lake Morgan watershed indicates that the spillway should have the capacity to discharge a flow of 300 cfs. Increasing the size of the spillway will decrease the present threat of overtopping the earth embankment.

I realize that the capacity of the outlet channel below the spillway may restrict the spillway flow. I, therefore, would like to inspect this area with you after the snow is gone and weather conditions are favorable. Please contact me at (518) 457-1216 for this field inspection. This inspection should be performed before March 15, 1978.

As I indicated in our phone conversation of January 19, 1978, every effort should now be made to lower the water surface of the lake by opening the valve. The need for additional storage becomes more critical as the spring run-off period approaches.

In our phone conversation of January 19, 1978, you indicated your concern with the effect that the lowered water surface would have with boating facilities on the lake. In order to construct a new spillway, you will have to either lower the water surface or build a cofferdam upstream of the spillway. It would appear that the proper time to do this work would be in May or June 1978, after the spring runoff has occurred and before the heavy recreational season begins. Our investigation indicates that

the new spillway would be about 20 feet long, with a depth of 3 feet above the spillway. These dimensions can vary in order to provide the spillway capacity for 300 cfs.

Please keep me posted on your lake level lowering. If you have any questions, call at (518) 457-1216.

Yours truly,

George Koch
Supervisor, Dam Safety Section

January 9, 1978

Mr. Willard Rivenburgh
Acting City Engineer
City of Poughkeepsie
No. 1 Mt. Carmel Place
Poughkeepsie, NY 12601

RE: Lake Morgan Dam #685,
Lower Reduction

Dear Mr. Rivenburgh:

This letter will confirm the information we discussed by phone on January 6, 1978 concerning our inspection of the Lake Morgan Dam. The inspection by Kenneth Warner and myself on January 5, 1978 indicated the following deficiencies on the 20 feet high earth dam.

1. The single 18" diameter RCP spillway does not have sufficient capacity to safely discharge flows through the spillway.

2. The overtopping of the earth embankment near the road is further evidence that additional spillway capacity is required. This is the area where the sandbags were placed last spring.

3. The spillway outlet channel is located along the toe of slope of the dam embankment. Embankment erosion could occur during high flow periods.

4. Soft spots along the downstream slope on the east side of the embankment indicates that seepage may be occurring. This area will be investigated more fully at a later date when less snow cover is on the dam.

5. Our records indicate that this dam was built in 1863. The dam now suffers from a lack of maintenance. The trees and brush that have grown along the downstream slope of the dam should be removed.

As a result of the above-mentioned deficiencies, the following remedial work should be performed as soon as possible.

1. The water surface of Morgan Lake should be lowered by opening the valve located in the manhole at the toe of the embankment. Since this lake is used primarily for recreational purposes, the water surface can be lowered at this time of the year without ill effects. The water surface should be lowered about 10 feet and then kept at this level. This additional lake storage will help keep the water surface below the top of dam during periods of snow melt or high runoff.

2. Additional sand bags should be stockpiled at the dam in the event that high water occurs. This is especially important if you are unable to open the drain valve.

The permanent improvements that are required at this structure that should be initiated at the beginning of the construction season are:

1. Increase the size of the existing spillway. I will perform a hydrologic investigation to inform you of the size spillway that is required in order to meet the New York State guidelines.

2. The top of the dam where the sand bags are now located will have to be permanently repaired.

3. The spillway outlet channel will have to be either cleared or realigned.

4. If further investigation indicates that any [illegible] seepage is occurring, a stone filter blanket may be required.

The above mentioned work will require the engineering services of either your Public Works Department or a consulting engineer. A permit will be required by the Department of Environmental Conservation before remedial engineering

Please keep us informed of your progress on this dam. If you have any questions, call us (518) 457-3216.

Yours truly,

George W. Koch
Supervisor, Dam Safety Section

cc: A. Campo

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, NEW YORK
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10007

NANYA-F

22 December 1977

ENGINEERING

Mr. Willard J. Rivenburgh
Acting City Engineer
City of Poughkeepsie
No. 1 Mt. Carmel Place
Poughkeepsie, New York

Inspected with City Engr on 5 Jan 78 RJP

Dear Mr. Rivenburgh:

Reference is made to your letter dated 18 November 1977, requesting advice and recommendations concerning the safety and maintenance of an earth dam impounding Morgan Lake which is located in the northeasterly corner of the City.

The National Dam Safety Program, authorized under the National Dam Inspection Act, Public Law 92-367, authorizes the Corps of Engineers to perform dam inspections in order to identify deficiencies and dangerous conditions with a view toward determining if they constitute a hazard to human life or property. A report evaluating the dam will be submitted to the Governor of the State. The State of New York has the responsibility for establishing the sequential priority of dams inspected in the State and is expected to undertake the management and construction of this program in the near future. Your letter will be submitted to the State for scheduling.

The Corps of Engineers also inspects dams under its own statutory authority, Public Law 99. Under this authority, which is supplementary to the efforts of State and local interests, a request from non-Federal interests for dam inspection when the structure is immediately and gravely threatened would be scheduled directly by the Corps in an expeditious manner for the purpose of reviewing the existing hazardous condition and providing technical advice and recommendations confined to and regarding removal of the immediate threat.

NANEN-P 22 December 1977 /2
Mr. Willard J. Rivenburgh

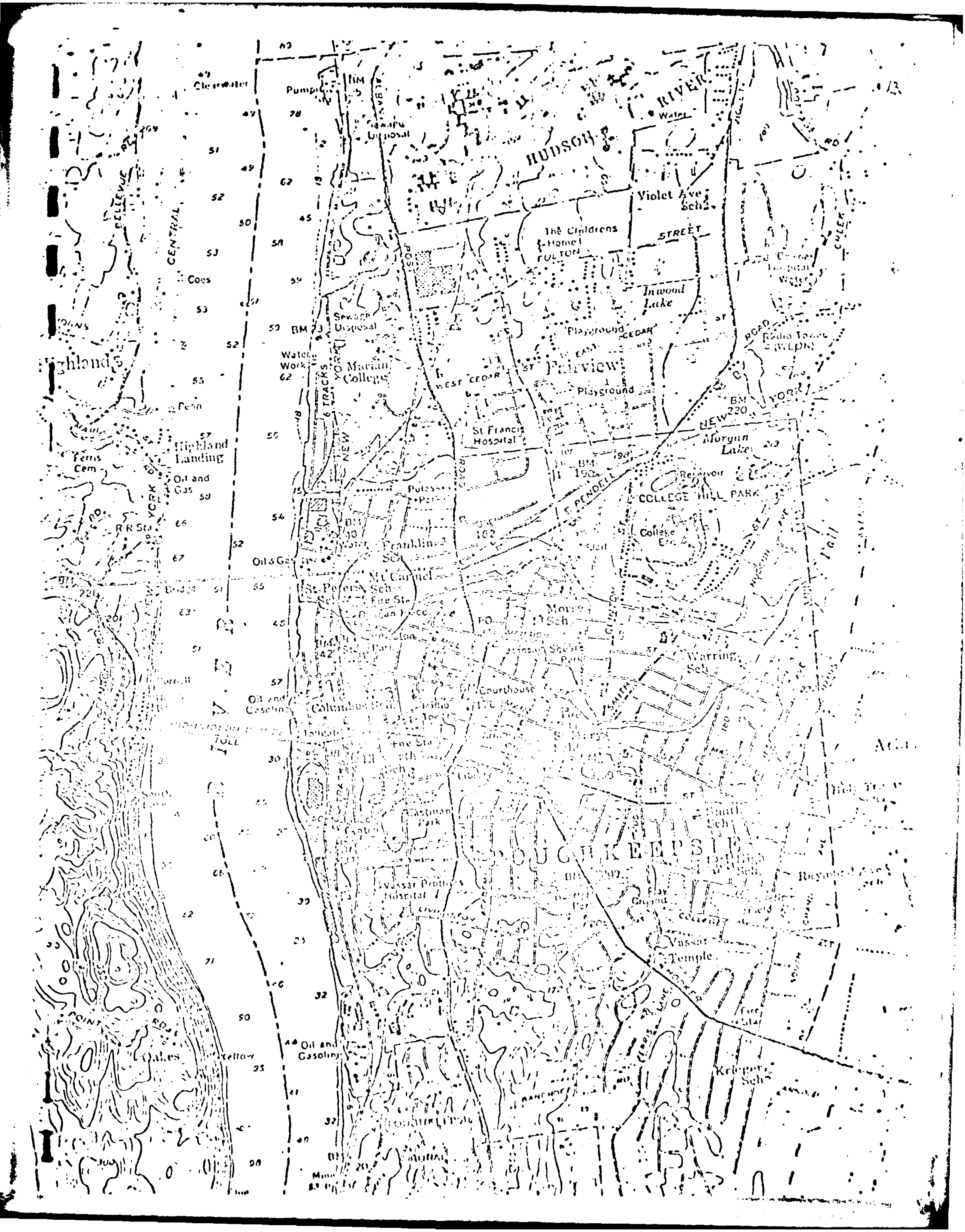
As telephonic contact concerning this matter by both the New York District Corps of Engineers and the New York State Department of Environmental Conservation has been unsuccessful, I trust the preceding has been helpful. Consideration will be given for a PL-99 inspection if you consider the condition of the referenced dam to be in such a state of disrepair as to warrant this type of inspection. If this is not the case, it will be scheduled for inspection by the State under the National Dam Safety Program.

Scheduling of the dam inspection is dependent upon your response to the above.

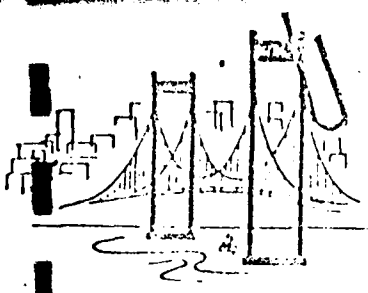
Sincerely yours,

cc w/incl:
Mr. George Koch
50 Wolf Road
Albany, New York 12233

J.A. WEISS
Chief, Engineering Division



HUDSON
RIVER
Clearwater
Pump
Violet Ave Sch
The Childrens Home
FULTON
STREET
Inwood Lake
Coes
Sewage Disposal
BM 73
Playground
CEDAR
Highlands
Water Works
Marian College
6 TRACKS
WEST CEDAR
Fairview
Playground
Radio Tower
NEW YORK
BM 220
Morgan Lake
St Francis Hospital
Highland Landing
Oil and Gas
Reservoir
COLLEGE HILL PARK
PENDELL
Pulaski Park
R R Sta
College
Franklin Sch
Mt Carmel Sch
St Peters Sch
Warring Sch
Courthouse
Oil and Gasoline
Columbus Sch
TOLL
Eastman Park
Smith Sch
POUGHKEEPSIE
Vassar Brothers Hospital
Vassar Temple
Oil and Gasoline
Oakes
Krieger Sch



CITY PLANNING BOARD

POUGHKEEPSIE, NEW YORK 12601
TELEPHONE 471-1066

CITY PLANNING BOARD
JOHN C. F. [illegible]
PLANNING DIRECTOR

February 1, 1973

Mr. Stanford Zeccolo
Senior Hydraulic Engineer
New York State Department of Environmental Conservation
Division of Resource Management Services
Bureau of Water Regulation
Albany, New York 12201

Dear Mr. Zeccolo:

Re: Department of Transportation
Registered Dam No. 685, Morgan Lake
Lower Hudson River Basin

With regard to your letter of December 1, 1972, please be advised that the following actions have been taken as per your request:

1. The water level is being lowered at present at a rate determined by the capacity of the storm drainage system below the dam.

2. The former leakage problem along Creek Road right-of-way has been eliminated by the installation of bituminous barrier.

3. The spillway area has been inspected by the City Engineer and the debris clogging the spillway has been removed by the City Department of Public Works.

4. An ongoing program of maintenance and repair has been initiated by the City and will continue as a direct result of the development of this lake for outdoor recreational purposes. We expect the Morgan Lake picnic area and outdoor recreational facilities to be formally opened in the early spring of 1973.

Very truly yours,

Philip R. Berrian

Philip R. Berrian
Deputy Planning Director

PB:sj

file 15

Division of Resource Management Services
Bureau of Water Regulation

December 1, 1972

The Honorable Jack Economou
City Hall
Poughkeepsie, New York 12601

Dear Mayor Economou:

Department of Transportation
Registered Dam No. 635, Morgan Lake
Lower Hudson River Basin

In conformance with the Department's Dam Safety Program, an inspection was made of the above-referenced dam on November 27, 1972. The [illegible] findings of that inspection are as follows:

It was originally built in 1868 and [illegible] has been recently [illegible]. A [illegible] spillway pipe has been [illegible] which [illegible] the spillway area. [illegible] work has been done adjacent to the highway.

- [illegible] through the [illegible] the highway.

[illegible]

[illegible] findings [illegible] conditions:

1. [illegible] the water level be [illegible] prevent a breach of the embankment adjacent to the highway.

2. [illegible] the leakage problem.

3. [illegible] engineer evaluate the spillway [illegible]

4. [illegible] from spillway and [illegible]

5. Establish a program of maintenance and repair.

Due to the limited scope of the work we have determined that the proj[illegible] does not fall within the intent of Section 15-0503 of the Environmental Conservation Law (former Section 429-c of the Conservation Law), [illegible]

AD-A092 039 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. MORGAN LAKE DAM (INVENTORY NUMBER --ETC(U)
SEP 80 E O'BRIEN DACW51-79-C-0001

UNCLASSIFIED NL

END
DATE FILMED
1-81
DTIC

...-4
... 3/77)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DAM INSPECTION REPORT
(By Visual Inspection)

Dam Number	River Basin	Town	County	Hazard Class	Date & Inspector
685	Lower Hudson	Poughkeepsie	Dutchess	C	6/2/11 Inc. 76

Stream = Owner = City of Poughkeepsie

Type of Construction

- ☐ Earth w/Concrete Spillway
- ☒ Earth w/15" Dia. Inlet Pipe (RCP)
- ☐ Earth w/Stone or Riprap Spillway
- ☐ Concrete
- ☐ Stone
- ☐ Timber
- ☐ Other _____

Use

- ☐ Water Supply
- ☐ Power
- ☒ Recreation - ☒ High Density
- ☐ Fish and Wildlife
- ☐ Farm Pond
- ☐ No Apparent Use-Abandoned
- ☐ Flood Control
- ☐ Other _____

Estimated Impoundment Size 12 Acres Estimated Height of Dam above Streambed 20 Ft.

Condition of Spillway (SINGLE)

- ☐ Service satisfactory
- ☐ Auxiliary satisfactory
- ☐ In need of repair or maintenance
- ☐ In need of repair or maintenance

Explain: 18" RCP Spillway - Not sufficient Capacity

Condition of Non-Overflow Section

- ☐ Satisfactory
- ☒ In need of repair or maintenance

Explain: Overtopping has occurred - sandbags along top of dam

Condition of Mechanical Equipment

- ☐ Satisfactory
- ☐ In need of repair or maintenance

Explain: _____

Siltation ☐ High ☐ Low

Explain: _____

Remarks: 1. Spillway here to be enlarged
2. Top of dam where sandbags are located - has to be repaired
3. Outlet spillway channel has to be realigned.
4. Seepage on downstream toe has to be investigated. Soil appears saturated when snow is gone

Evaluation (From Visual Inspection)

- ☒ Repairs req'd. beyond normal maint.
- ☐ No defects observed beyond normal maint.

Spillway some 4/74 epil

Map 212
Dam c.
685 LH

20

Form IWSL 6 11 15 5000 (16-1M58)

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

DAM REPORT

_____, 191....
(Date)

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the _____ Dam.

This dam is situated upon the _____
(Give name of stream)
in the Town of _____, _____ County,
about _____ (State distance) from the Village or City of _____.

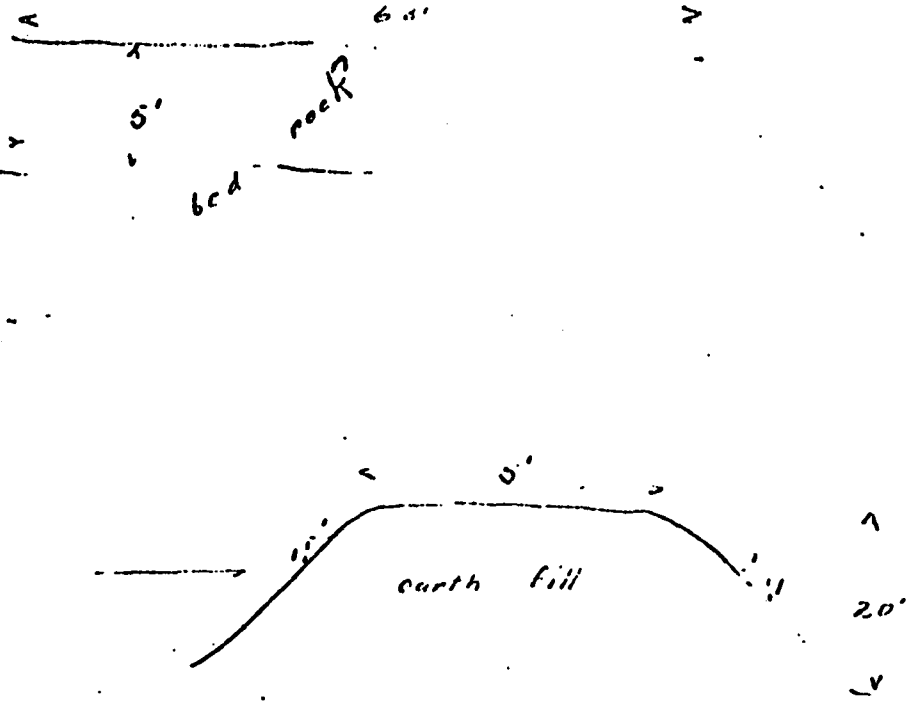
The distance _____ (Up or down) stream from the dam, to the _____ (Give name of nearest important street or bridge),
is about _____ (State distance).

The dam is now owned by _____
(Give name in full)
and was built in or about the year _____, and was extensively repaired or reconstructed during the year _____.

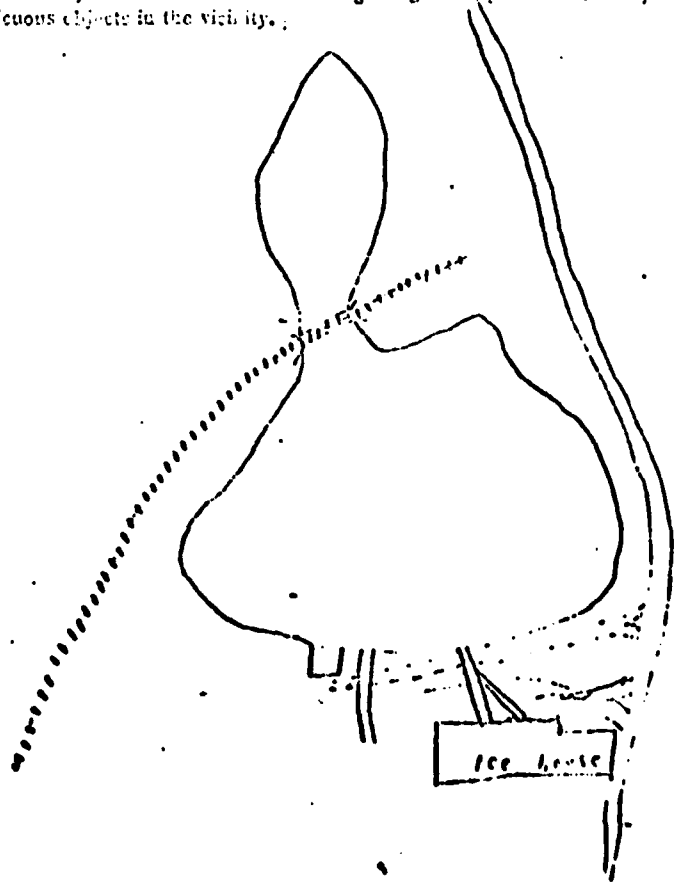
As it now stands, the spillway portion of this dam is built of _____
(State whether of masonry, concrete or timber)
and the other portions are built of _____
(State whether of masonry, concrete, earth or timber with or without rock fill)

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is _____ and under the remaining portions such foundation bed is _____.

(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)



(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or conspicuous objects in the vicinity.)



The total length of this dam is 277 feet. The spillway or waste-weir portion, is about 9 feet long, and the crest of the spillway is about 5 feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: one 6" one one 12" for the drainage.

State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

Good

Reported by [signature]
(Signature)

(Address—Street and number, P. O. Box or R. F. D. route)

(Name of place)

(SEE OTHER SIDE)

APPENDIX F

REFERENCES

References

1. "HEC-1 Flood Hydrograph Package for Dam Safety Investigations", U.S. Army Corps of Engineers, September 1978

2. "Lower Hudson River Basin Hydrologic Flood Routing Model", for New York District Corps of Engineers, Water Resources Engineers, January 1977

3. "Standard Project Flood Determination", EM 1110-0-1411, Army Corps of Engineers, Washington, D.C., Rev. 1965

4. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian", Hydrometeorological Report No. 51, National Weather Service, June 1978

5. "National Program of Inspection of Dams", Vol. 3, Department of the Army, Office of the Chief of Engineers, 1975

6. "Flood Hydrograph Analyses and Computations", EM-1110-2-1405, U.S. Army Corps of Engineers, August 1959

7. "Recommended Guidelines for Safety Inspection of Dams", Department of the Army, Office of the Chief of Engineers, Appendix D

8. "Physiographic Diagram of North America", by A. K. Lobeck, The Geographical Press, Columbia, N.J.

DEC DAM INSPECTION REPORT

RB	CTY	YR. AP.	DAM NO.	INS. DATE	USE	TYPE
01	14	01	685	11272	002	3

1868. Culvert under roadway embankment

AS BUILT INSPECTION

1 Location of Spillway and outlet

2 Elevations

2 Size of Spillway and outlet

2 Geometry of Non-overflow section

2 GENERAL CONDITION OF NON-OVERFLOW SECTION

2 Settlement SA = .0251 = 12.8%

2 Joints 11x20

1 Undermining 7x12.8 = 89 AF

1 Cracks

0 Surface of Concrete

1 Settlement of Embankment

2 Downstream Slope - Trees

2 Upstream Slope

1 Deflections

1 Leakage

1 Crest of Dam

1 Toe of Slope

2 GENERAL CONDITION OF SPILLWAY AND OUTLET WORKS

4 Auxiliary Spillway

1 Joints

2 Mechanical Equipment

4 Service or Concrete Spillway

4 Surface of Concrete

4 Plunge Pool

4 Stilling Basin

1 Spillway Toe

4 Inlet

Maintenance

Evaluation

3 Hazard Class

2 Inspector

COMMENTS:

Spillway channel congested with logs and debris causing water level to raise in turn causing leaking along highway embankment

Spillway channel also made smaller than original design by putting only a 2' culvert pipe under roadway over

Morgan Lake Dam - City of Poughkeepsie

Determine Spillway Size

Drainage Area = 343 Acres (From USGS 212 A Poughkeepsie N.Y.

Hazard = Class "C"

(Field inspection 6 Jan 78 G.K & K.H.)

Design Flood = 40 % MPF

Note: Existing Structure will not be able to meet this Hydrologic Criteria

∴ For Class "B" Hazard

Design Flood = 150 % of 100 Yr

100 Yr - 6 Hr P = 5"

100 Yr - 24 Hr P = 7.5"

Surface Area of Lake = 11 Acres (From U.S.G.S Survey)

Runoff

P = 5" } R = 2.05"
N = 70 }

Vol Runoff

$\frac{2.05}{12}$ = 343 Ac = 59 A.F.

Peak Inflow

P_{24} = 7.5" }
D.A = 343 Ac } Q = 290 cfs
CN = 70 }

Slope - Flat — Note: Although there are some steep areas the vast majority is flat or moderate. Use flat because rapid advance in city will [illegible]

19 JAN 78
G. KOCH
18

Peak Outflow

Surface Area = 17 Acres

Volume Runoff = 59 A.F.

∴ Lake has very little storage capacity

∴ Peak Inflow = Peak Outflow

Driveway

Q = 210 cfs

Eq. h = 3' From inspection picture it appears that 3 ft of head is

$Q = CLh^{3/2}$

$L = \frac{Q}{Ch^{3/2}} = \frac{210}{3.1(3)^{3/2}} = \frac{210}{5.20} = 18'$ Use 20'

$Q = CLh^{3/2}$

$Q = 3.1(20)(3)^{3/2} = 372$ cfs OK